

Town of Arlington Community Preservation Act Committee

Final Application for FY20 CPA funding

Submission deadline: December 9, 2019 at 4:00 p.m.

Summary

The Community Preservation Act Committee is pleased to accept applications for project funding under the Community Preservation Act (CPA) in the 2021 fiscal year budget cycle.

There are two phases in the CPA funding application process: a preliminary application and a final application. The preliminary application phase chiefly determines general eligibility for CPA funding, and concludes in October. This document contains information and forms for the final application.

Final applications are accepted only from applicants who submitted a preliminary application in this cycle and were invited by the committee to submit a final application.

The final application form is on pages A1-A3 at the end of this document. Please carefully read the prior information about the application review and project funding processes before submitting the application.

Final applications must be received by 4 p.m. on December 9, 2019 to be eligible for consideration. Applications will be reviewed by the CPAC at its regularly scheduled meetings, which are open to the public. Final applications voted upon favorably by the CPAC will be recommended to the Town Meeting for funding at Annual Town Meeting commencing in April 2020. CPA project funding appropriated by Town Meeting will be available on or after July 1, 2020, which is the start of fiscal year 2021.

Before submitting CPA funding applications, please carefully review the chart from the Massachusetts Department of Revenue at the end of this document. It summarizes allowable spending purposes under the CPA. Applications submitted to the CPAC for FY2020 funding must clearly fit one or more of these purposes to be considered for funding. The CPA legislation (<https://www.communitypreservation.org/text-legislation>) provides detailed definitions of the chart categories. Please also note that in accordance with state law, CPA funds may not be used for maintenance.

Additionally, the committee's annual reports about recent CPA projects and budgets will be especially helpful to applicants who are new to CPA in Arlington (see www.arlingtonma.gov/communitypreservation).

Contact: Julie Wayman, CPAC Liaison, jwayman@town.arlington.ma.us or 781-316-3005

1. Application Submission

Applications are accepted only from applicants who submitted a preliminary application earlier in the same cycle and who were invited by the CPAC to submit a final application. Please note that being invited to submit a final application does not imply funding approval or endorsement from the CPAC, only that the project is likely to meet the allowable use requirement for CPA funding set forth by state law, and relevant local CPA policies established by the CPAC. Only after reviewing all final applications will the CPAC determine which projects to recommend to Town Meeting for funding.

Applicants must submit one (1) electronic copy and three (3) hard copies of the [Final Application](#) (pages A1-A3 of this document) to the Community Preservation Act Committee (CPAC) **no later than 4 p.m. on December 9, 2019**, with the electronic copy sent to jwayman@town.arlington.ma.us and the hard copies to:

Community Preservation Act Committee c/o Julie Wayman
Town of Arlington, 730 Mass Ave., Arlington, MA 02476

Applications will be date stamped and assigned control numbers in the order that the hard copies are received.

2. Application Review

Following the submission deadline, the CPAC will review the applications. Applicants will be contacted if additional information or an interview is required. The CPAC may also request to visit the site of the proposed project.

Applicants submitting final applications will present their projects at a [CPAC Public Meeting in January 2020 to](#) address questions from the CPAC and Arlington residents. Applicants will be required to provide summary information about the project in writing and make copies for distribution and review at the Public Meeting. This is also an opportunity for applicants to ask the CPAC any questions regarding the application or funding process.

Unless an applicant can demonstrate that a significant opportunity would otherwise be lost, applications will not be accepted after the deadline. **In order for the CPAC to consider a project proposal that cannot adhere to the deadline, the project must meet the additional selection criteria as outlined in the [Special Application Process](#)** (see page 7).

Applicants will be notified in February 2020 about whether or not the CPAC plans to recommend their project at Annual Town Meeting, which commences in late April.

(continued next page)

3. CPAC Consultation with Other Town Bodies

The CPAC will next consult with the Board of Selectmen, the Capital Planning Committee, the Finance Committee, the Redevelopment Board and the Planning Department staff regarding the selected projects. The CPAC will then reassess each project in light of these advisory consultations, including an examination of whether or not sponsors have performed sufficient research to identify the secondary budgetary effects of their projects.

The CPAC reserves the right to withdraw its support for any proposed project at this CPAC Meeting or at any point prior to the 2020 Annual Town Meeting.

4. Annual Town Meeting

The CPAC will present the recommended projects at **Annual Town Meeting for discussion and vote**. Selected applicants are expected to be available to attend Town Meeting on the night their proposal is presented, to answer questions from Town Meeting members. Town Meeting has the final authority to award the CPAC's recommended funds from Arlington's Community Preservation Act Fund.

5. Project Funding

Funding for projects approved by Town Meeting will be available starting July 1 of the applicable fiscal year (July 1, 2020 for FY2021).

Projects financed with CPA funds must comply with all applicable state and municipal requirements, including the state procurement law, which requires special procedures for the selection of products, vendors, services, and consultants. Project sponsors are required to meet with Arlington's Town Manager or his designee before the Town will enter any into contracts or issue any purchase orders. However, this requirement can be waived if adherence to procurement procedures will be overseen by a Town Department Head or other MCPPO certified third party.

CPA funds may not be used to reimburse project expenses incurred prior to the start of the fiscal year to which they were appropriated by Town Meeting. For FY20210-funded projects, all CPA expenses must be incurred on or after July 1, 2020, the start of FY2021.

All CPA funds are administered and disbursed by the Town of Arlington. Project management, oversight, execution, and financial control will be under the joint control of the CPAC and the Town Manager or his designee.

The CPAC requires periodic status updates from the recipients of CPAC funding. Updates will occur no less than annually and upon project completion. Written updates will be coordinated by the liaison to the CPAC. The purpose of such update is to aid the CPAC in refining the CPA Plan, in identifying issues that may assist future applicants, and in reporting progress to the Town.

For more information regarding the **Funding Process**, refer to page 6 of this document.

2019-2020 CPA Timeline

August 2019	Preliminary Applications available
October 11, 2019	Preliminary Applications due (11:00 am)
October 2019	CPAC invites Final Applications
December 9, 2019	Final Applications due
January 2020	Public presentations by applicants
January 2020	CPAC selects recommended projects
February 2020	CPAC consults with other town bodies
March 2020	CPAC finalizes recommended projects
April 2020	Annual Town Meeting begins

If you have additional questions about this process, please contact:

Julie Wayman
CPAC Liaison
jwayman@town.arlington.ma.us
781-316-3005

The following is a list of CPAC members as of October 2019:

Eugene Benson
Redevelopment Board Designee

Pamela Heidell
Conservation Commission
Designee, Interim

Eric Helmuth, Chair
Select Board Appointee

Leslie Mayer
Park & Recreation Commission
Designee

Charlie McCabe
Select Board Appointee

Richard Murray
Housing Authority Designee

JoAnn Robinson
Historical Commission Designee

Clarissa Rowe, Vice Chair
Select Board Appointee

Ann Woodward
Select Board Appointee

Community Preservation Act Committee Town of Arlington

Special Application Process

Use of the **Special Application Process** is only granted by the CPAC under the unique circumstances that a significant opportunity would otherwise be lost if the application were to be processed using the standard timeline (as outlined in the **Standard Application**.)

The CPAC will allow an applicant to utilize the Special Application Process only if the project meets the General Selection Criteria of the Community Preservation Plan, the Specific Criteria for the affected community asset category, and the following additional criteria:

- The proponents were unaware of the opportunity to undertake the project; or the proponents did not have authority to identify the opportunity prior to the regular application deadline.
- The applicant has either: (a) a letter of intent signed by the current owner of the real property expressing an interest in selling to the applicant; or (b) legal control (an option, signed purchase and sale agreement or legal title) of the real property.
- The project is supported by one or more Boards with responsibility for projects of a similar nature.
- Failure to secure CPA funding will create a high likelihood that the project will not be able to be carried out to the benefit of the Town, because the opportunity is of very short duration.
- Appropriation of CPA funding will contribute materially to the likelihood of success for the project.
- The project holds a high priority in the Master Plan, the Housing Plan, the Open Space and Recreation Plan, or other planning documents currently accepted and utilized by the Town.

Should the CPAC grant use of the **Special Application Process**, the CPAC will continue to adhere to the applicable procedures as outlined in the **Standard Application Process**. Only the pertinent submission and hearing deadlines will be changed in order to accommodate the unique conditions surrounding the proposed project.

If the timing of the application is such that the CPAC cannot meet the deadline for the Annual Town Meeting, the applicant or the Selectmen must call a **Special Town Meeting** for the purpose of considering the appropriation of CPA funds for the proposed project. The CPAC will not be responsible for recommending a **Special Town Meeting** or any other changes in the Town's calendar

Community Preservation Act Committee Town of Arlington

Funding Process

Initial Documentation

Following approval via appropriation from Arlington's **Annual Town Meeting or Special Town Meeting**, the Community Preservation Act Committee will notify grant recipients of the funding that has been awarded. This award letter will outline any terms, funding conditions, or additional instructions applicable to the approved CPA grant. A confirmation of receipt must be returned to the CPAC as proof that project sponsors received the procurement procedures and accepted the terms and conditions outlined in the award letter.

Projects financed with CPA funds must comply with all applicable state and municipal requirements, including the state procurement law, which requires special procedures for the selection of products, vendors, services, and consultants. Project sponsors are required to meet with the Town Manager's staff before the Town will enter any into contracts or issue any purchase orders. However, this requirement can be waived if adherence to procurement procedures will be overseen by a Town Department Head or other MCPPO certified third party.

Should a property or artifact that has benefitted from CPA funding be sold or given to a new owner within five years of the award letter's issuance date, the CPA fund must be reimbursed the entire amount awarded unless the CPAC waives this requirement in part or in its entirety.

Supplementary contracts may be required by the Town Manager's Office, depending on the details of the approved project. For construction projects, recipients of CPA funds and all contractors on the project may be asked to have their general liability insurer add the Town of Arlington as an additional insured. Proof of this coverage must be submitted to the CPAC before any invoices can be paid using CPA funds. Projects on Town owned properties that are already required to indemnify the Town may be asked to reconfirm coverage before any invoices can be paid.

Updates to the CPAC

Grant recipients will notify the CPAC when work on projects has commenced and submit periodic project status updates. Progress Reports will be submitted to the CPAC and incorporated into the Annual Town Meeting CPA package. Approved projects will be carried out in accordance with the terms outlined in the award letter and any supplementary contracts from the Town. Any significant deviations from the project as presented in the original **Application** must be approved by the CPAC to ensure that such changes are CPA-eligible expenditures and within the scope of the project as approved by Town Meeting.

Grant recipients should contact the **Community Preservation Act Committee Liaison, Julie Wayman**, at jwayman@town.arlington.ma.us or 781-316-3005, to notify the CPAC of any significant changes to their projects.

Expenditures

Invoices will be submitted to the CPAC for their approval. Approved expenditures will be processed through the Town Comptroller's Office and paid through the Treasurer's Office. Any funds for a CPA project that remain at the completion of work will return to the general CPA fund once the project is officially closed. The remaining funds will then be re-appropriated at the next Town Meeting, unless the CPAC votes to approve the use of remaining funds for the completion of additional related work. In such cases, approval will be dependent upon whether the additional proposed work is within the general scope and intent of the original [Application](#).

Closing Process

CPA grant recipients will notify the CPAC in writing through a Final Progress Report when work is completed for their project. Once this notification is received, the CPAC will review the initial acceptance letter to make sure that all terms and conditions have been met. The CPAC will schedule a final site visit as appropriate with the CPA grant recipient to examine and photograph the completed work. If a final site visit is not appropriate for the project, the CPAC may accept photographs or hardcopies of the deliverable as additional proof that the CPA project has been completed. The CPAC will also generate a final summary of the CPA fund expenditures for the project. Once all tasks have been performed, the CPAC will vote to officially close the project file.

Once the project file is officially closed, the CPAC will work with the Town Comptroller to return any unexpended funds to the general CPA fund. **Projects must be officially closed before June 30 of the current year for the funds to be available for re-appropriation at the following year's Town Meeting.**

Additional Requirements

CPA grant recipients are required to acknowledge the Community Preservation Act in all press releases, publicity materials, news, and written or oral announcements about work supported by CPA funds. When applicable and upon request, a sign acknowledging the contribution of CPA funds must be posted in a visible public location at the project worksite for the duration of the active work period. The sign will be furnished by the CPAC.

Projects receiving CPA funds must be completed within 30 months following the Town Meeting approval, unless the CPAC votes to approve an extension of time due to compelling and documented circumstances. Without such support, the CPAC may recommend to rescind any remaining CPA funds at a subsequent Town Meeting.

Community Preservation Act Committee Town of Arlington

CPA Funding – FY2021 Final Application

One (1) electronic copy and three (3) hard copies of the completed application must be submitted to the CPAC **no later than 4 p.m. on December 9, 2019** in order to be considered for advancement to the final application stage, with the electronic copy sent to jwayman@town.arlington.ma.us and the hard copies to:

Community Preservation Committee c/o Julie Wayman
Town of Arlington, 730 Massachusetts Ave., Arlington, MA 02476

Applications will be date stamped and assigned control numbers in the order that the hard copies are received. This PDF form may be completed on a computer using [Adobe Reader](#).

1. General Information

Project Title: _____

Applicant/Contact: _____

Organization: _____

Mailing Address: _____

Telephone: _____ E-mail: _____

2. CPA Eligibility (refer to the chart on page A-4)

CPA Category (select one):

☐ Community Housing ☐ Historic Preservation ☐ Open Space ☐ Recreation

CPA Purpose (select one):

☐ Acquisition ☐ Creation ☐ Preservation ☐ Support ☐ Rehabilitation & Restoration

3. Budget

Amount Requested: _____ Total Project Cost: _____

Signature _____ Date _____

—

Please answer and document all questions on the following page

PROJECT DESCRIPTION: Attach answers to the following questions. Applications will be returned as incomplete if all requested information is not provided. Include supporting materials as necessary.

1. **Goals:** What are the goals of the proposed project?
2. **Community Need:** Why is the project needed? Does it address needs identified in existing Town plans? If so, please specify.
3. **Community Support:** What is the nature and level of support for this project? Include letters of support and any petitions.
4. **Project Documentation:** Attach any applicable engineering plans, architectural drawings, site plans, photographs, any other renderings, relevant studies or material.
5. **Timeline:** What is the schedule for project implementation, including a timeline for all critical milestones?
6. **Credentials:** How will the experience of the applicant contribute to the success of this project?
7. **Budget:** What is the total budget for the project and how will funds be sourced and spent? All items of expenditure must be clearly identified. Distinguish between hard and soft costs and contingencies. (NOTE: CPA funds may not be used for maintenance.)
8. **Other Funding:** What additional funding sources are available, committed, or under consideration? Include commitment letters, if available, and describe any other attempts to secure funding for this project.
9. **Maintenance:** If ongoing maintenance is required for your project, how will it be funded?
10. **Impact on Town Budget:** What, if any, potential secondary effects will your proposed project have on the Town's Operating Budget? Are there any capital projects that rely on the successful completion of your project?

ADDITIONAL INFORMATION: Provide the following additional information, as applicable.

1. **Control of Site:** Documentation that you have control over the site, such as a Purchase and Sales Agreement, option or deed. If the applicant does not have site control, explain what communications have occurred with the bodies that have control and how public benefits will be protected in perpetuity or otherwise.
2. **Deed Restrictions:** In order for funding to be distributed, an appropriate deed restriction, meeting the requirements of Chapter 184 of Mass General Laws pursuant to section 12 of the Community Preservation Act, must be filed with the CPAC. Provide a copy of the actual or proposed restrictions that will apply to this project.
3. **Acquisitions:** For acquisition projects, attach appraisals and agreements if available. Attach a copy of the deed.

4. **Feasibility:** Provide a list of all further actions or steps that will be required for completion of the project, such as environmental assessments, zoning approvals, and any other known barriers to moving forward.
5. **Hazardous Materials:** Provide evidence that the proposed project site is free of hazardous materials or there is a plan for remediation in place.
6. **Permitting:** Provide evidence that the project does not violate any zoning ordinances, covenants, restrictions or other laws or regulations. What permits, if any, are needed for this project? Provide the expected date of receipt for necessary permits, and copies of any permits already acquired.
7. **Environmental Concerns:** Identify all known wetlands, floodplains, and/or any natural resource limitation that occur within the boundaries of your submission.
8. **Professional Standards:** Evidence that appropriate professional standards will be followed if construction, restoration or rehabilitation is proposed. Evidence that the applicant and the project team have the proven or potential capacity to conduct the scope and scale of the proposed project, as evidenced by project leaders with appropriate qualifications and technical experience or access to technical expertise.
9. **Further Attachments:** Assessor's map showing location of the project.

REMINDER: Projects financed with CPA funds must comply with all applicable state and municipal requirements, including the state procurement law, which requires special procedures for the selection of products, vendors, services, and consultants. Project sponsors will be required to meet with Arlington's Town Manager before the Town enters into any contracts or issues any purchase orders. However, this requirement can be waived if adherence to procurement procedures will be overseen by a Town Department Head or other MCPPO certified third party.

Chart 1
COMMUNITY PRESERVATION FUND ALLOWABLE SPENDING PURPOSES (G.L. c. 44B, § 5)

	OPEN SPACE	HISTORIC RESOURCES	RECREATIONAL LAND	COMMUNITY HOUSING
DEFINITIONS (G.L. c. 44B, § 2)	Land to protect existing and future well fields, aquifers and recharge areas, watershed land, agricultural land, grasslands, fields, forest land, fresh and salt water marshes and other wetlands, ocean, river, stream, lake and pond frontage, beaches, dunes and other coastal lands, lands to protect scenic vistas, land for wildlife or nature preserve and land for recreational use	Building, structure, vessel, real property, document or artifact listed on the state register of historic places or determined by the local historic preservation commission to be significant in the history, archeology, architecture or culture of the city or town	Land for active or passive recreational use including, but not limited to, the use of land for community gardens, trails, and noncommercial youth and adult sports, and the use of land as a park, playground or athletic field Does <u>not</u> include horse or dog racing or the use of land for a stadium, gymnasium or similar structure.	Housing for low and moderate income individuals and families, including low or moderate income seniors Moderate income is less than 100%, and low income is less than 80%, of US HUD Area Wide Median Income
ACQUISITION Obtain property interest by gift, purchase, devise, grant, rental, purchase, lease or otherwise. Only includes eminent domain taking as provided by G.L. c. 44B	Yes	Yes	Yes	Yes
CREATION To bring into being or cause to exist. <i>Seideman v. City of Newton</i> , 452 Mass. 472 (2008)	Yes	X	Yes	Yes
PRESERVATION Protect personal or real property from injury, harm or destruction	Yes	Yes	Yes	Yes
SUPPORT Provide grants, loans, rental assistance, security deposits, interest-rate write downs or other forms of assistance directly to individuals and families who are eligible for community housing, or to entity that owns, operates or manages such housing, for the purpose of making housing affordable	X	X	X	Yes, includes funding for community's affordable housing trust
REHABILITATION AND RESTORATION Make capital improvements, or extraordinary repairs to make assets functional for intended use, including improvements to comply with federal, state or local building or access codes or federal standards for rehabilitation of historic properties	Yes if acquired or created with CP funds	Yes	Yes	Yes if acquired or created with CP funds

Goals

The goal of this project is to continue implementing the recommendations of the Preservation Master Plan for the Old Burying Ground ("OBG") completed by Ray Dunetz Landscape Architecture, Inc. (RDLA) that was generously funded by a previous CPA grant in 2018 and is appended to this application. Thank you again for the prior planning grant; it is our hope you will find the Preservation Master Plan lays the groundwork for a thoughtful restoration effort over the years to come. Phase 1 wall restoration work is set to begin in spring of 2020 based on design documentation being developed by Simpson Gumpertz & Heger beginning in December 2019. It should be noted the design procurement covered all phases of wall restoration, allowing this application to seek solely additional construction funding.

More specifically, in the second phase of the restoration, we plan to continue the repair and rebuilding of the failing perimeter wall. The work will begin where phase 1 is set to leave off, at the wall opening for the walking path that bifurcates the site. From here, the work will continue along Peg Spengler way towards the Robbins Library and turn the corner at the First Parish UU Church. Restoration work will continue along the wall until approximately the point where the wall meets the northeast mound tombs.

The point where the wall turns back towards Pleasant St. is where the wall is closest to Peg Spengler Way. Not only is the wall near its tallest point here, it is also at this point that the road is at its most narrow, subjecting the wall to vehicle strikes and heaving due to years of snow and ice operations. Because of this, it is expected the wall will require a significant level of effort, at the most challenging location on site, to restore its integrity and return it as near as possible to its original condition. As was the case in phase 1, this stretch of wall also incorporates multiple masonry construction types, which will require different restorative techniques and approaches. As much of the original stone and construction material as possible will be reused during the course of the restoration effort.

Community Need

The Old Burying Ground on Pleasant St. in Arlington Center is one of two public cemeteries maintained by the Town of Arlington. As stated in the Arlington Town Master Plan (Arlington Master Plan, Your Town, Your Future, adopted February 4, 2015, pages 115-116) the Old Burying Ground was established in 1732 and is the oldest cemetery in Arlington. It has an impressive collection of early slate markers dating from the establishment of the cemetery. It contains the remains of Jason Russell and 11 other early patriots who died on April 19, 1775 during the Battle of Menotomy. The Old Burying Ground is included in the Arlington Center National Register District and is protected by a preservation restriction.

In addition to the contributions to Arlington's rich history that this property holds, it offers green open space for passive recreation such as walking and bird watching in a predominantly urbanized landscape. Years of natural forces, deferred maintenance, and insufficient capital investment has led to generalized state of disrepair, threatening the rich history described above.

Community Support

Community support for this restoration effort has been very positive. The various members submitting this application have been approached with much positive feedback from other residents in town, including at a public forum to discuss the Preservation Master Plan held at the Robbins Library.

Please see the attached letters from:

Director of Health & Human Services Christine Bongiorno (2019)

Event Coordinator Patsy Kraemer (2019)

Director of Public Works Michael Rademacher (2018)

Unitarian Universalist Church Rev. Marta Flanagan (2018)

Chamber of Commerce Director Beth Locke (2018)

Former Menotomy Minutemen Captain Thomas Potter (2018)

Arlington Historical Society President Stuart Brorson (2016)

Menotomy Minutemen Captain James McLean (2016)

Project Documentation

Please find included herewith the following documents:

1. Preservation Master Plan for the Old Burying Ground and Mount Pleasant Cemetery Tombs prepared by RDLA in consultation with the team of consultants including Ivan Myjer of local firm Building and Monument Conservation.
2. Technical memorandum prepared by Simpson Gumpertz & Heger outlining construction engineering, phasing and estimating for the perimeter wall renovations.

Timeline

<i>Task</i>	<i>Target Date</i>
Project Approval	May 2019
Funds Available	July 2019
Construction Procurement	July-August 2019
Construction Mobilization	Fall 2020
Construction Completion	Spring 2021 (weather dependent)

Credentials

This project will be jointly managed by the Arlington Cemetery Commission and the Arlington Historical Commission with staff support from the Town Manager's Office and Jean Smith.

The Arlington Historical Commission and the Arlington Cemetery Commission both have oversight of these cemeteries, specific to their areas of interest. The Arlington Historical Commission is knowledgeable in the history of the areas, what constitutes a historically correct preservation process, what is needed to help with maintenance after the work is done, and how to follow the Massachusetts laws that govern such projects. The Arlington Cemetery Commission is knowledgeable in regards to cemetery concerns and preservation, while also following the laws that govern cemeteries, and the activities of a cemetery.

Via a detailed procurement, the project team will seek proposals and bids only from duly qualified design and construction firms experienced with the restoration of historic masonry walls in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties and the Guidelines for the Treatment of Cultural Landscapes.

Budget

Construction	\$155,019.00
Construction Contingency (20%)	\$31,445.00
Total	\$186,464.00

*Line item budget to follow

Other Funding

This project unsuccessfully sought funding from the Massachusetts Cultural Facilities Fund in calendar year 2019. At present, no other viable grant opportunities have been identified.

Maintenance

The wall repairs completed as part of this project would be expected to last a significant number of years before maintenance pointing is necessary. If any mortar loss or failure is addressed in a timely fashion, the cost is expected to be minimal, and performed in-house or through the DPW operating budget.

Impact on Town Budget

Receipt of a CPA grant would directly reduce the burden on the Town's capital budget, which is the only other viable potential source of funding for this scope of work. It should be noted, however, work related to this project does not presently reside in the 5 year capital plan.

Control of Site

The land is owned and managed by the Town of Arlington. A GIS map of the site was prepared for your review.

Deed Restrictions

A copy of the Preservation Restriction (filed in 2000) held by the Massachusetts Historical Commission in perpetuity is attached.

Acquisitions

N/A

Feasibility

There are no known zoning or environmental barriers to moving forward with this project.

Hazardous Materials

There is no evidence that there are hazardous materials at the project site.

Permitting

Massachusetts Historical Commission (MHC) will require a Project Notification Form (PNF) to be filled out and submitted for their review.

Environmental Concerns

There are no apparent environmental concerns that require remediation.

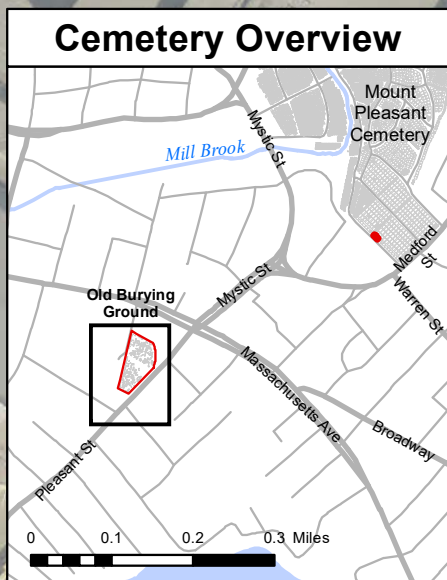
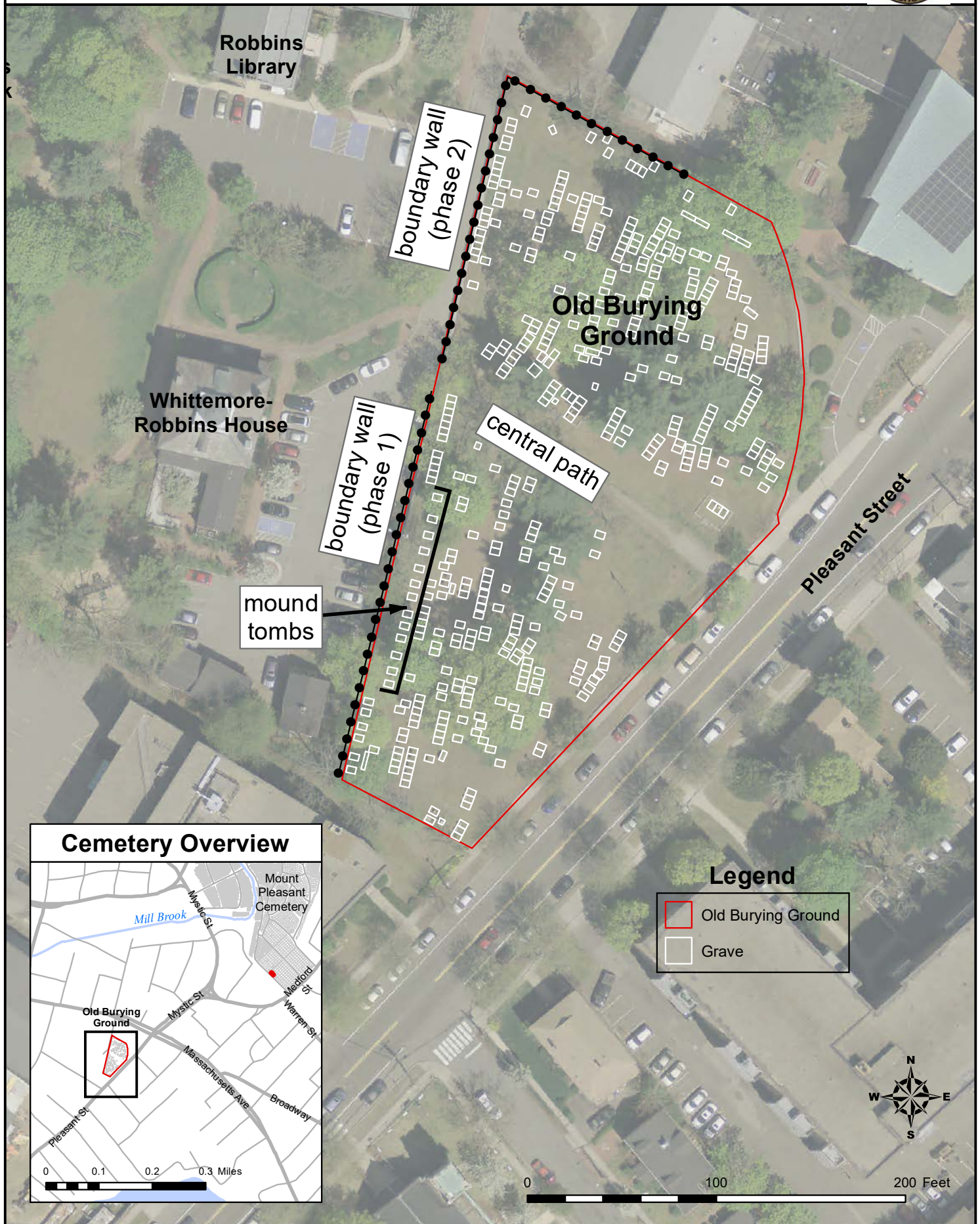
Professional Standards

As noted previously, the project team will collaborate with a design firm as well as a construction contractor who will perform to appropriate industry standards. The design firm will be experienced in historic preservation, more specifically, masonry wall restoration. The firm will demonstrate experience in at least three related historic preservation projects. The contractor will have demonstrated experience in the field of historic masonry, and the project team will check references in accordance with standard procedure. Of course, as this property resides in the civic block and has a place on the historic register, the project will be guided by the theories, methods, and practices of historic preservation as outlined in the Secretary of the Interior's Standards for the Treatment of Historic Properties and the Guidelines for the Treatment of Cultural Landscapes.

Old Burying Ground

Arlington, MA

Map for created by the
Arlington GIS Office, 12/9/2019.



Legend

- Old Burying Ground
- Grave



2020 Proposed Restoration Work on the Old Burying Ground

G Parsons

3-Oct-19

2018 Costs taken from SGH Memorandum dated 6 Dec 18

Costs adjusted from 2018 to 2020 by 12.4% (2 years at 6%)

Direct Cost Task Item

Costs 2018	Costs 2020	
Equipment Mobilization	\$5,918	\$6,652
Detail Excavation-Unload walls for Resetting Base Stones	\$10,054	\$11,301
Dismantle Wall Sections to Base and Reset	\$22,468	\$25,254
Stone Wall Cleaning and Repairs	\$51,508	\$57,895
Loam and Seed	\$5,474	\$6,153
	\$95,422	\$107,254 \$107,254

Indirect Costs

Costs 2018	Costs 2020	
Project Manager	\$18,911	\$21,256
PU Trucks/Cars	\$2,994	\$3,365
Safety Supplies	\$250	\$281
	\$22,155	\$24,902 \$24,902

Direct and Indirect
OH&P
Insurance (1.25%)
Bond (0.75%)

117,577	\$132,157	\$132,157
17,636	\$19,823	\$19,823
1,690	\$1,900	\$1,900
1,014	\$1,140	\$1,140

Subtotal \$137,917 \$155,019 \$155,019

Contingency (20%) \$27,583.40 \$31,445 \$31,445

Total \$186,464



Town of Arlington
Department of Health and Human Services
27 Maple Street
Arlington, MA 02476
www.arlingtonma.gov

Tel: (781) 316-3170
Fax: (781) 316-3175

December 2, 2019

Arlington Community Preservation Act Committee
730 Massachusetts Avenue
Arlington, MA 02476

To Whom It May Concern:

I write to support the FY21 CPA application to repair the perimeter wall at the Old Burying Ground.

The wall abuts the Whittemore Robbins Estate which is a valuable town resource that currently houses the Arlington Youth Counseling Center. The estate also hosts private events including weddings on the weekends. In the coming years, the activities will also expand into the Whittemore Robbins Carriage House and Cottage where events will be hosted and additional counseling offices will be added.

The wall is within feet from the Whittemore Robbins Cottage and in its current state, poses a risk to the structure.

Please do not hesitate to contact me should you need additional information.

Sincerely,

A handwritten signature in cursive script that reads "Christine Bongiorno".

Christine Bongiorno
Director of Health and Human Services



Robbins Memorial Town Hall
730 Massachusetts Avenue
Arlington, Massachusetts 02476

26 November 2019

**Community Preservation Committee
Town of Arlington
730 Mass. Ave.
Arlington, Ma. 02476**

To Whom it May Concern:

I am writing on behalf of the project team that is submitting a proposal for CPA funds to continue work on the Old Burying Ground, specifically to rebuild the perimeter wall.

As you know we have been very successful in the Town of Arlington in renting our beautiful buildings in the civic block - the Robbins Memorial Town Hall, the Whittemore Robbins House, and the Robbins Library - for special events. Our beautiful building and grounds are used for weddings, bar/bat mitzvah's, retirement parties, special birthday parties, memorial services, showers, and other kinds of gatherings. We have brought a significant sum of money to the Town with these rentals.

We're always complimented on the beautiful buildings and grounds we have - they are a "hidden secret" to many who come for these special parties! Even some Arlington residents are surprised.

So it's very important that we maintain the vitality and beauty of all these buildings and grounds and areas surrounding them.

The Old Burying Ground is such a special historical site in Arlington and is a feature that point out to our many guests. It's important to maintain the wall as an important part of that structure.

**I certainly hope that you will look favorably on this proposal to
rebuild the wall of the Old Burying Ground.**

Many thanks for your consideration.

Sincerely,

Patsy Kraemer

**Patsy L. Kraemer
Events Coordinator
Town of Arlington
730 Mass. Ave.
Arlington, Ma. 02476**



DEPARTMENT OF PUBLIC WORKS

TOWN OF ARLINGTON
51 Grove Street
Arlington, Massachusetts 02476
Telephone (781) 316-3104, Fax (781) 316-3281

November 30, 2018

Community Preservation Act Committee
Arlington Town Hall
Arlington, MA 02476

**RE: Community Preservation Act (CPA) Application
Old Burying Ground Phase I Construction**

Dear Committee Members:

I am writing to support the proposed CPA application for the Old Burying Ground (OBG) Phase I Construction Project. I am very encouraged by the work to date in studying the existing condition of the OBG and the team of professionals assembled to perform the work.

The OBG is very rich in history and occupies such a prominent place in Arlington's downtown landscape that improvements here will be appreciated by residents, businesses and visitors to the community.

The Public Works Department is eager to see this project progress and is able to support it in any means possible to see its successful completion.

I would also like to comment on the value of the Old Burying Ground and Mount Pleasant Cemetery Preservation Study funded by the CPA in FY2018. While necessary repairs to vault tombs in the Mount Pleasant Cemetery are not included in current CPA application, the DPW has requested the use of additional Cemetery Perpetual Care Funds in its FY2020 Operating Budget to perform the work. Having the study as support for the request will go a long way in securing the funding.

Thank you for your consideration of the Commission's application. Please do not hesitate to contact me with any questions.

Very truly yours

Michael Rademacher
Director, DPW



First Parish a liberal religious community welcoming to all

first gathered 1739

became Unitarian 1829

First Universalist Society organized 1840

First Parish Unitarian Universalist created from their merger 1965

630 Massachusetts Avenue Arlington MA 02476 781 648 3799 www.firstparish.info

November 29, 2018

To Whom It May Concern:

I write in support of the efforts to restore the cemetery on Pleasant Street that abuts First Parish. Renovations will not only honor those who are buried there, but also create safer grounds for those visiting the cemetery.

Our courtyard and playground are adjacent to the cemetery. A public walkway alongside the courtyard and playground is lined by a crumbling wall of the cemetery that threatens the safe passage of visitors to First Parish and those en route to the library and Town Hall.

First Parish of Arlington would be relieved to have the Community Preservation Act contribute to the funding of the restoration of the cemetery which will create a safer, more sacred, and more beautiful space for not only the neighbors of the cemetery but also for all of Arlington.

Gratefully,

Rev. Marta Morris Flanagan

December 3, 2018

Community Preservation Act Committee
Arlington Town Hall
Arlington, MA 02476

RE: Old Burying Ground CPA Application

I am writing to express support of the application by the Arlington Cemetery Commission, for funding under the Arlington Community Preservation Act for an Historical Preservation Survey to assess current conditions and to assist in planning for preservation and restoration of the Old Burying Ground. This treasure in the heart of Arlington is the site of the graves of many people who played important roles in the history of Arlington, including Jason Russell of Revolutionary War fame and his eleven comrades who were killed in the bloodiest skirmish of the first day of the American Revolution.

Historic sites like the Old Burying Ground are treasures and important to our town for a variety of reasons. The Chamber supports the preservation and restoration of this site as an asset to the town and it's businesses. It is a significant historic and cultural asset which serves to attract visitors and tourists to Arlington and in turn contributes to the economic vibrancy of our business districts, most specifically Arlington Center.

Money from the CPA fund would be used to fund the activities of a Landscape Preservation Architect who may employ an archeologist to assess where unmarked burials may be located and an arborist to manage the trees on the property. Professionals experienced in headstone restoration and who have conducted inventories of the Old Burying Ground graves will be asked to update their database. A structural engineer will be consulted regarding the walls and retaining walls. Local funeral homes have enthusiastically agreed to help with respectful transportation and storage of remains during restoration of tombs and graves.

I appreciate your consideration of the grant request for preserving this important and highly visible historic open space in the heart of Arlington.

Sincerely,

Beth Locke

Executive Director, Arlington Chamber of Commerce

39 Harvard Road
Belmont, MA 02478
December 3, 2018

Community Preservation Act Committee
Arlington Town Hall
Arlington, MA 02476

RE: Old Burying Ground CPA Application

I am writing to express support of the application by the Arlington Cemetery Commission, for funding under the Arlington Community Preservation Act for the first phase of the restoration of the Old Burying Ground. An evaluation funded by a previous CPA grant showed that wall and tomb repair as well as vegetation removal are needed to ensure the preservation of the Old Burying Ground.

Although I am now a resident of Belmont, I raised my children in Arlington and am still a member of Arlington's own Menotomy Minute Men as well as the Arlington Historical Society. The Burying Ground is one of very few precious remainders from Arlington's early history, containing graves of many people who played important roles in the history of Arlington. Among them are Jason Russell and his eleven comrades who were killed in the bloodiest skirmish of the first day of the American Revolution; it also contains remains of British soldiers who died that day. As such, the Old Burying Ground is important for national as well as local history.

As a quick inspection will show you, time, weather and volunteer trees have all taken their toll on this ancient burying ground. The walls surrounding the burying ground are crumbling in places presenting a hazard to pedestrians on both sides of the walls, some of which are adjacent to a nursery school and a church. The tombs in the burying ground are not secure and appear to need of masonry and brick work. Headstones have tumbled in some places and others need cleaning and restoration.

When I go to Arlington schools in my role as a modern-day Minute Man, I tell the children that they can see and touch the past by visiting the graves of the heroes and victims of that crucial day in our history. It is important that the Burying Ground be conserved so future generations will have a tangible connection to Arlington's past and its often-overlooked role in the founding of our country.

I appreciate your consideration of the grant request for preserving this important and highly visible historic open space in the heart of Arlington.

I remain yr. most humble and obd't Servant,

Thomas M. Potter
Member and Past Captain, Menotomy Minute Men
Member and Former Trustee, Arlington Historical Society

Stuart Brorson
Arlington Historical Society
7 Jason Street
Arlington, MA 02476

December 4th, 2016

Community Preservation Act Committee
Arlington Town Hall
Arlington, MA 02476

RE: Old Burying Ground CPA Application

Dear Committee Members,

I am writing to express support of the application by the Arlington Cemetery Commission, for funding under the Arlington Community Preservation Act for an Historical Preservation Survey to assess current conditions and to assist in planning for preservation and restoration of the Old Burying Ground. The Old Burying Ground is an important link to Arlington's long and interesting history.

Records indicate that the Old Burying Ground dates back to 1724, when the road to Watertown (today's Pleasant Street) was moved in order to make room for a place to bury residents of the village of Menotomy. The first burials date to 1736. Prior to that time, deceased Menotomy residents were often buried at the burial ground in Harvard Square.

One of the most prominent features of the Old Burying Ground is the nineteen foot high granite obelisk honoring those killed in Menotomy on the first day of the Revolutionary War, April 19, 1775. At the time Jason Russell and eleven other patriots were buried in a mass grave, without coffins and in the clothes in which they fell. A headstone for Jason Russell was erected near the site of the mass grave. It reads, "Mr. Jason Russell was barbarously murdered in his own house by Gage's bloody troops, on the 19th of April, 1775, aetatis 59. His body is quietly resting in this grave with Eleven of our friends, who in like manner, with many others, were cruelly slain, on that fatal day. Blessed are the dead who die in the Lord." The obelisk was erected in 1848 to honor those casualties of the first day of the American Revolution. Jason Russell's house, where he was killed by the retreating British, is today owned by the Arlington Historical Society, and is opened to the public as a museum interpreting the events of that important day.

Another notable Arlingtonian buried in the Old Burying Ground is Sam Whittemore, the official Massachusetts state hero. He was an 80 year old man on April 19, 1775, and therefore too old to be a member of the town militia. Not content to sit idly by while the British retreated through his village, he took pair of his own pistols and shot and killed three soldiers. In response, "he was shot, bayoneted, beaten and left for dead, but recovered and lived to be 98 years of age." This act made him a local celebrity for the last 18 years of life, so much so that a long obituary commemorating his life was published in the Columbian Centinel (the major Boston newspaper of the time) when he finally passed in 1798. An 1875 historical stone telling this story sits in front of the Jefferson Cutter house in Arlington Center today.

Many other important Arlington residents are buried in the Burying Ground. For example, George Y. Wellington is buried along the wall next to the Whittemore-Robbins House parking lot, not far from the entrance. As a young man he helped survey the course of the West Cambridge and Lexington Railroad (1845-6), whose path is now the Minuteman Bike Trail through Arlington. In later years he went on to become the founder of the Arlington Historical Society (1897).

The Burying Ground remains a beautiful town landmark today, but time, weather, and human activity have taken their toll. The walls surrounding the burying ground are crumbling in places, and some granite top-pieces are fallen or missing. The tombs in the burying ground are not secure and appear to need of masonry and brick work. Headstones have tumbled in some places and others need restoration. The Burying Ground needs some care and attention to keep it beautiful and historic for the next 292 years.

Please look favorably on the CPA grant request to preserve this historic treasure at the center of Arlington.

Very truly yours,

Stuart Brorson
President, Arlington Historical Society

04 December, 2016

Community Preservation Act Committee
Arlington Town Hall
Arlington, MA 02476

RE: Old Burying Ground CPA Application

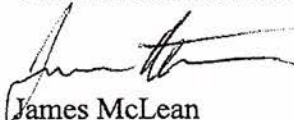
I am writing to express support of the application by the Arlington Cemetery Commission, for funding under the Arlington Community Preservation Act for a Historical Preservation Survey to assess current conditions and to assist in planning for preservation and restoration of the Old Burying Ground. This treasure in the heart of Arlington is the site of the graves of many people who played important roles in the history of Arlington, including Jason Russell and the eleven men killed in the bloodiest skirmish of the first day of the American Revolution. The Burial Ground includes members of the original Menotomy Minuteman Company as well as two British soldiers killed in the Battle of Menotomy.

In preparation for the Patriot's Day activities, I personally spent time in the burial ground clearing fallen limbs from the past winter storms. I noted that time, weather and trees have had an impact on the burial markers and stone work of the site. The walls surrounding the burying ground are crumbling in spots, presenting safety concerns to pedestrians and children in the adjacent nursery school. I noted there are a number of headstones which are in need of restoration, repair and cleaning. I know that members of my company as well as other local re-enacting groups would be very keen to help to conserve the grounds, especially with the looming 250th anniversary of the April 19, 1775 battle and founding of the nation.

Money from the CPA fund would be used to fund the activities of a Landscape Preservation Architect who may employ an archeologist to assess where unmarked burials may be located and an arborist to manage the trees on the property. Professionals experienced in headstone restoration and who have conducted inventories of the Old Burying Ground graves will be asked to update their database. A structural engineer will be consulted regarding the walls and retaining walls. Local funeral homes have enthusiastically agreed to help with respectful transportation and storage of remains during restoration of tombs and graves. Also if any remains are moved, I'm certain Provincial and Crown forces of the local reenacting community would like to render honors to those interred in the Old Burial Ground.

I appreciate your consideration of the grant request for preserving this important and highly visible historic open space in the heart of Arlington.

Your Most Humble and Obedient Servant,



James McLean

Captain, Menotomy Minutemen

Attachment 8

Deed Restriction

On

The Old Burying Ground

By

The Arlington Historical Commission

And

The Town of Arlington

PRESERVATION RESTRICTION AGREEMENT
between the COMMONWEALTH OF MASSACHUSETTS
by and through the MASSACHUSETTS HISTORICAL COMMISSION
and the

Town of Arlington

The parties to this Agreement are the Commonwealth of Massachusetts, by and through the Massachusetts Historical Commission located at the Massachusetts Archives Building, 220 Morrissey Boulevard, Boston, Massachusetts 02125, hereinafter referred to as the Commission and the Town of Arlington, 730 Massachusetts Avenue, Arlington, MA 02476 hereinafter referred to as the Grantor.

WHEREAS, the Grantor is the owner in fee simple of certain real property with improvements known as the Town Hall Gardens, and including the Winfield Robbins Memorial Garden, thereon as described in a deed dated 24 May, 1898, from Pattee et ux et al to Town of Arlington, recorded with the Middlesex Registry of Deeds, Book 2657, Page 490, and in a deed dated 9 July, 1898, from Lowe, Tr. to Town of Arlington, recorded with the Middlesex Registry of Deeds, Book 2669, Page 467, and which is located at 730 Massachusetts Avenue; and

WHEREAS, the Grantor is the owner in fee simple of certain real property with improvements known as the Old Burying Ground, located on Pleasant Street in Arlington Center, Massachusetts, thereon as described in the Town of Arlington Assessor's Records and being a portion of the land shown on Assessor's Map 11 as Block 1, Lot 3, hereinafter referred to as the Premises. This instrument does not create any new street or lot boundaries.

WHEREAS, the Grantor wishes to impose certain restrictions, obligations and duties upon it as the owner of the Premises and on the successors to its right, title and interest therein, with respect to maintenance, protection, and preservation of the Premises in order to protect the architectural, archaeological and historical integrity thereof; and

WHEREAS, the Premises is listed in the State Register of Historic Places as a contributing property to the Arlington Town Center National Register Historic District; and

WHEREAS, the preservation of the Premises is important to the public for the enjoyment and appreciation of its architectural, archaeological and historical heritage and will serve the public interest in a manner consistent with the purposes of M.G.L. chapter 184, section 32, hereinafter referred to as the Act; and

WHEREAS, the Commission is a government body organized under the laws of the Commonwealth of Massachusetts and is authorized to accept these preservation restrictions under the Act;

NOW, THEREFORE, for good and valuable consideration, the Grantor conveys to the

Commission the following preservation restrictions, which shall apply in Perpetuity to the Premises.

These preservation restrictions are set forth so as to ensure the preservation of those characteristics which contribute to the architectural, archaeological and historical integrity of the Premises which have been listed on the National and/or State Registers of Historic Places, under applicable state and federal legislation.

Characteristics which contribute to the architectural, archaeological and historical integrity of the Premises include, but are not limited to, the artifacts, features, materials, appearance, and workmanship of the Premises, including those characteristics which originally qualified the Premises for listing in the National and/or State Registers of Historic Places.

The terms of the Preservation Restriction are as follows:

1. Maintenance of Premises: The Grantor agrees to assume the total cost of continued maintenance, repair and administration of the Premises so as to preserve the characteristics which contribute to the architectural, archaeological and historical integrity of the Premises in a manner satisfactory to the Commission according to the Secretary of the Interior's "Standards for the Treatment of Historic Properties."

The Grantor may seek financial assistance from any source available to it. The Commission does not assume any obligation for maintaining, repairing or administering the Premises.

2. Inspection: The Grantor agrees that the Commission may inspect the Premises from time to time upon reasonable notice to determine whether the Grantor is in compliance with the terms of this Agreement.

3. Alterations: The Grantor agrees that no alterations shall be made to the Premises, including the alteration of any interior, unless (a) clearly of minor nature and not affecting the characteristics which contribute to the architectural, archaeological or historical integrity of the Premises, or (b) the Commission has previously determined that it will not impair such characteristics after reviewing plans and specifications submitted by the Grantor, or (c) required by casualty or other emergency promptly reported to the Commission. Ordinary maintenance and repair of the Premises may be made without the written permission of the Commission. For purposes of this section, interpretation of what constitutes alterations of a minor nature and ordinary maintenance and repair is governed by the Restriction Guidelines which are attached to this Agreement and hereby incorporated by reference.

4. Assignment: The Commission may assign this Agreement to another governmental body or to any charitable corporation or trust among the purposes of which is the maintenance and preservation of historic properties only in the event that the Commission should cease to function in its present capacity.

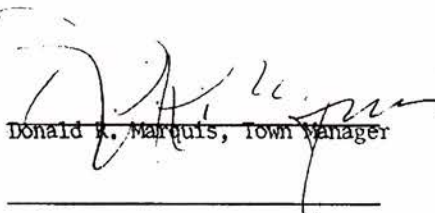
5. Validity and Severability: The invalidity of M.G.L. c. 184 or any part thereof shall not affect the validity and enforceability of this Agreement according to its terms. The invalidity or unenforceability of any provision of this Agreement shall not affect the validity or enforceability of any other provision of this Agreement.

6. Recording: The Grantor agrees to record this Agreement with the appropriate Registry of Deeds and file a copy of such recorded instrument with the Commission.

7. Other Provisions: None applicable.

The burden of these restrictions enumerated in paragraphs 1 through 7, inclusive, shall run with the land and is binding upon future owners of an interest therein.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this 23rd day of May, 2000.


Donald R. Marquis, Town Manager

COMMONWEALTH OF MASSACHUSETTS

Middlesex _____, ss.

May 23, 2000

Then personally appeared the above named Donald R. Marquis
and acknowledged the foregoing instrument to be the free act and deed of Donald R. Marquis
before me,

Notary Public
My Commission Expires October 7, 2005



APPROVAL BY THE MASSACHUSETTS HISTORICAL COMMISSION

The undersigned hereby certifies that the foregoing preservation restrictions have been approved pursuant to Massachusetts General Laws, Chapter 184, section 32.

MASSACHUSETTS HISTORICAL COMMISSION

By Judith B. McDonough
Judith B. McDonough
Executive Director and Clerk
Massachusetts Historical Commission

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss. December 1, 1999

Then personally appeared the above named Judith B. McDonough and acknowledged the foregoing instrument to be the free act and deed of the Massachusetts Historical Commission, before

Notary Public

Elsa H. Fitzgerald
My Commission Expires 10/9/03

RESTRICTION GUIDELINES

The purpose of the Restriction Guidelines is to clarify paragraph three of the terms of the preservation restriction, which deals with alterations to the premises. Under this section permission from the Massachusetts Historical Commission is required for any major alteration. Alterations of a minor nature, which are part of ordinary maintenance and repair, do not require MHC review.

In an effort to explain what constitutes a minor alteration and what constitutes a major change, which must be reviewed by the MHC, the following list has been developed. By no means is this list comprehensive: it is only a sampling of some of the more common alterations, which may be contemplated by building owners.

PAINT

Minor - Exterior or interior hand scraping and repainting of non-decorative and non-significant surfaces as part of periodic maintenance.

Major - Painting or fully stripping decorative surfaces or distinctive stylistic features including murals, stenciling, wallpaper, ornamental woodwork, stone, decorative or significant original plaster.

WINDOWS AND DOORS

Minor - Regular maintenance including caulking, painting and necessary reglazing. Repair or in-kind replacement of existing individual decayed window parts.

Major - Wholesale replacement of units; change in fenestration or materials; alteration of profile or setback of windows. The addition of storm windows is also considered a major change; however, with notification it is commonly acceptable.

EXTERIOR

Minor - Spot repair of existing cladding and roofing including in-kind replacement of clapboards, shingles, slates, etc.

Major - Large-scale repair or replacement of cladding or roofing. Change involving inappropriate removal or addition of materials or building elements (i.e. removal of chimneys or cornice detailing; installation of architectural detail which does not have a historical basis); altering or demolishing building additions; spot repointing of masonry. Structural stabilization of the property is also considered a major alteration.

LANDSCAPE/OUTBUILDINGS

Minor - Routine maintenance of outbuildings and landscape including lawn mowing, pruning, planting, painting, and repair.

Major - Moving or subdividing buildings or property; altering of property; altering or removing significant landscape features such as gardens, vistas, walks, plantings; ground disturbance affecting archaeological resources.

WALLS/PARTITIONS

Minor - Making fully reversible changes (i.e. sealing off doors in situ, leaving doors and door openings fully exposed) to the spatial arrangement of a non-significant portion of the building.

Major - Creating new openings in walls or permanently sealing off existing openings; adding permanent partitions which obscure significant original room arrangement; demolishing existing walls; removing or altering stylistic features; altering primary staircases.

HEATING/AIR CONDITIONING/ELECTRICAL/PLUMBING SYSTEMS

Minor - Repair of existing systems.

Major - Installing or upgrading systems which will result in major appearance changes (i.e. dropped ceilings, disfigured walls or floors, exposed wiring, ducts, and piping); the removal of substantial quantities of original plaster or other materials in the course of construction.

Changes classified as major alterations are not necessarily unacceptable. Under the preservation restriction such changes must be reviewed by the MHC and their impact on the historic integrity of the premise assessed.

It is the responsibility of the property owner to notify the MHC in writing when any major alterations are contemplated. Substantial alterations may necessitate review of plans and specifications.

The intent of the preservation restriction is to enable the Commission to review proposed alterations and assess their impact on the integrity of the structure, not to preclude future change. MHC staff will attempt to work with property owners to develop mutually satisfactory solutions, which are in the best interests of the property.

OLD BURYING GROUND & TOMBS AT MOUNT PLEASANT CEMETERY PRESERVATION PLAN

ARLINGTON, MASSACHUSETTS 2018



OLD BURYING GROUND & TOMBS AT MOUNT PLEASANT CEMETERY PRESERVATION PLAN

ARLINGTON, MASSACHUSETTS

NOVEMBER 2018

TOWN OF ARLINGTON

Dan Dunn, Select Board Chair

Adam Chapdelaine, Town Manager

**ARLINGTON CEMETERY COMMISSION, ARLINGTON HISTORICAL
COMMISSION & ARLINGTON HISTORICAL SOCIETY**

RAY DUNETZ LANDSCAPE ARCHITECTURE, INC.

ACKNOWLEDGEMENTS

This Condition Assessment and Preservation Plan for the Old Burying Ground builds upon the work of staff, agencies, organizations and notable individuals who work to preserve and protect this important cultural resource.

This project was made possible with the gracious support of the people of Arlington through the Community Preservation Act.

ARLINGTON COMMUNITY PRESERVATION ACT COMMITTEE

Eric Helmuth, Chair

TOWN OF ARLINGTON

Adam Chapdelaine, Town Manager

Jim Feeney, Assistant Town Manager/ Records Access Officer

ARLINGTON CEMETERY COMMISSION

Michele Hassler, Chair

ARLINGTON HISTORICAL COMMISSION

JoAnn Robinson, Chair

ARLINGTON HISTORICAL SOCIETY

George Parsons

OTHER REVIEWERS

Jean Smith, Mount Pleasant Cemetery Administrator

CONSULTANTS

Ray Dunetz Landscape Architecture, Inc.

Ray Dunetz, Principal, Landscape Architect

Michelle de Tarnowsky, Landscape Architect

Nancy Leask, Landscape Architect

Ivan Myjer, Building and Monument Conservation

Barbara Keene Briggs, Certified Arborist, Tree Specialists, Inc.

David Ropes, Certified Arborist, Tree Specialists, Inc.

Michael Agonis, Environmental Scientist, Pine & Swallow Environmental

Stephanie Davis, EIT, Structures North Consulting Engineers, Inc.

Stephen R. Garvin, Professional Engineer, Samiotes Consultants, Inc.

Todd M. Chapman, Project Land Surveyor, Samiotes Consultants, Inc.

OLD BURYING GROUND **& TOMBS AT MOUNT PLEASANT CEMETERY** **PRESERVATION PLAN**

ARLINGTON, MASSACHUSETTS

NOVEMBER 2018

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SUMMARY

Along with several important historical sites, Arlington's Old Burying Ground [OBG] holds the history of Arlington's founding and legacy of its cultural heritage. The gravestones, tomb markers and monuments honor the founding members of the community including revolutionary heroes and outstanding figures in our nation's history. Tightly woven into Arlington's historic fabric, the Old Burying Ground is part of Arlington's Civic Block and is listed on the National Register of Historic Places. The goal of the conditions assessment and preservation plan is to present important preservation issues and identify how to address them in order to best protect this valuable historic resource. Included in this Conditions Assessment and Preservation Plan are 5 tombs at Mount Pleasant Cemetery [MPC].

The preservation work began with research into the land use history of the Old Burying Ground, revealing a familiar story of designation, establishment and growth, and eventual neglect mandating its preservation. Pasture land originally owned by townsman Jason Russell was designated as a burial ground in 1724. The land at that time was sparsely vegetated except for a stand of willows along the stream which ran through the middle of the property. The site was actively used for burials for over 100 years and accommodated other civic needs at various times.

Since its establishment and throughout the period of active use, the town desired to construct a proper enclosure but struggled to appropriate the funds to do so. After years of use and then finally suffering from over crowding, the town purchased land for a second burial ground, Mount Pleasant Cemetery in 1843. With sufficient resources, the Town was also able to construct a proper enclosure for the OBG and trees were planted, bringing the OBG to a state of completion.

The present day Old Burying Ground reflects a degree of neglect typical of many historic burying grounds throughout New England. Allocating the funds needed for its proper preservation and maintenance has proven difficult. Turned over grave markers and barren earth are evidence of this neglect, undermining its value to the Arlington community and its importance in Arlington's history.

The team assembled to assess the burying ground was led by landscape architects and included a civil engineer, structural engineer, arborist, and stone conservator. Our goal was to inventory site elements, assess their health and condition, identify safety issues and provide recommendations for their improvement. ➤

Our assessment revealed a range of issues related to neglect and misguided efforts in preservation work. Construction techniques used to repair failing walls exacerbated structural issues found in several boundary walls. The lawn is struggling due to infertile and compacted soils. Shade trees (in good condition) are in need of pruning, while volunteer trees are growing too close to walls and mound tombs compromising structural integrity. The main pedestrian path through the cemetery is eroded and inaccessible according to current Americans with Disabilities Act regulations.

With our understanding of the current issues facing the burying ground and its history, we determined how best to restore and preserve the historic site. Our treatment recommendations are focused on public safety and preservation of the historic fabric of the site. The enclosure of the Old Burying Ground is failing in places, and significant portions of the walls need to be reconstructed. Other sections of walls and mound tombs only require repointing. Our assessment has identified 22 trees as invasive or volunteer material, which are recommended for removal. Soil quality needs to be improved, and shade tolerant turf grasses need to be sown to restore the lawn.

Our prioritized recommendations include an estimate of costs, with safety issues at the forefront. Three priority levels for improvements have been developed: high, medium and low.

Items regarded as high priority are typically related to issues of public safety, structural stability and protection of historic fabric, and should be corrected within one year without resource constraints.

Items listed as medium priority should be corrected within five years and relate to issues including; preventing accelerated deterioration or damage which could lead to higher future costs, replacement of items which are expected to last less than five years, and repair or replacement of items that significantly detract from the appearance of a burying ground.

Low priority items include cosmetic repairs and future considerations that can be delayed at least five years. Stone marker conservation is not addressed in this report.

Maintenance practices at the Old Burying Ground are of utmost importance. Many of the issues facing the Old Burying Ground today are a result of deferred maintenance or inappropriate preservation efforts that have created larger issues for the burying ground. The ultimate success of the preservation of the Old Burying Ground lies in the successful execution of appropriate maintenance practices and life cycle planning. The management guide provides the outline of maintenance requirements to properly manage the historic cemetery and its historic artifacts, and provide a guideline for its preservation for generations to come. ■

INTRODUCTION

The Old Burying Ground is a 1.34 acre lot located within the municipal core of Arlington. Located just south of the Unitarian Universalist Church at the corner of Massachusetts Avenue and Pleasant Street, the burying ground is visible from Pleasant Street, its eastern border. Peg Spengler Way which accesses the Robbins Library parking lot and the Whittemore Robbins House, abuts the burying grounds western border. The Verizon central office building located at 67 Pleasant Street lies to the south of the OBG.

The tombs under consideration at Mount Pleasant Cemetery are located just off Medford Street, Latitude: 42.41707 (42° 25' 1.46" N) Longitude: -71.14891 (71° 8' 56.06" W).

In the Fall of 2007, an extensive survey of the existing conditions of the markers, tombs and walls at the Old Burying Ground was undertaken and documented. The two volume "Conditions Assessment Report for the Markers, Tombs, and Walls in Arlington's Old Burying Ground" report was prepared by Ivan Myjer of Building and Monument Conservation.

In 2015, funding became available for historic preservation in Arlington through the Community Preservation Act, passed by the community in November of 2014. In 2016, the OBG Working Group, comprised of the Cemetery Commission, the Arlington Historical Commission and the Arlington Historical Society, applied for a grant from Arlington's Community Preservation Committee to assess

conditions at the OBG and selected tombs at Mount Pleasant Cemetery. On May 1, 2017 Arlington voted to fund the grant.

Preservation planning for Arlington's Old Burying Ground is tied to the cultural significance of the site and the artifacts contained within. These historic artifacts are finite and a deteriorating resource that require preservation and protection from damage by weather, vegetation and visitors, as well as deferred and inappropriate maintenance practices.

While decisions regarding the preservation of artifacts of the burying grounds are a relatively straightforward matter, decisions related to the appropriate overall landscape image of the burying grounds are more difficult because of the changes that have occurred over more than three centuries.





Recommendations in this report follow the 1996 Secretary of the Interior's Standards for the Treatment of Historic Properties. This includes Guidelines for the Treatment of Cultural Landscapes which addresses four treatments: preservation; rehabilitation; restoration; and reconstruction. "Of the four, Preservation standards require retention of the greatest amount of historic fabric, including the landscape's historic form, features and details as they evolved over time."

The specific goals for the Conditions Assessment and Preservation Plan for the OBG and the selected tombs at MPC are as follows:

- Create a plan of action to ensure protection of this resource for future generations.
- Using documentary research, evaluation, inventory, conditions assessment survey and identification of threats to historic elements, three components of the plan will be developed:
 1. Existing Conditions and Assessment
 2. Recommendations for Preservation and Budget Projections
 3. Management Guidelines ■

HISTORICAL DEVELOPMENT

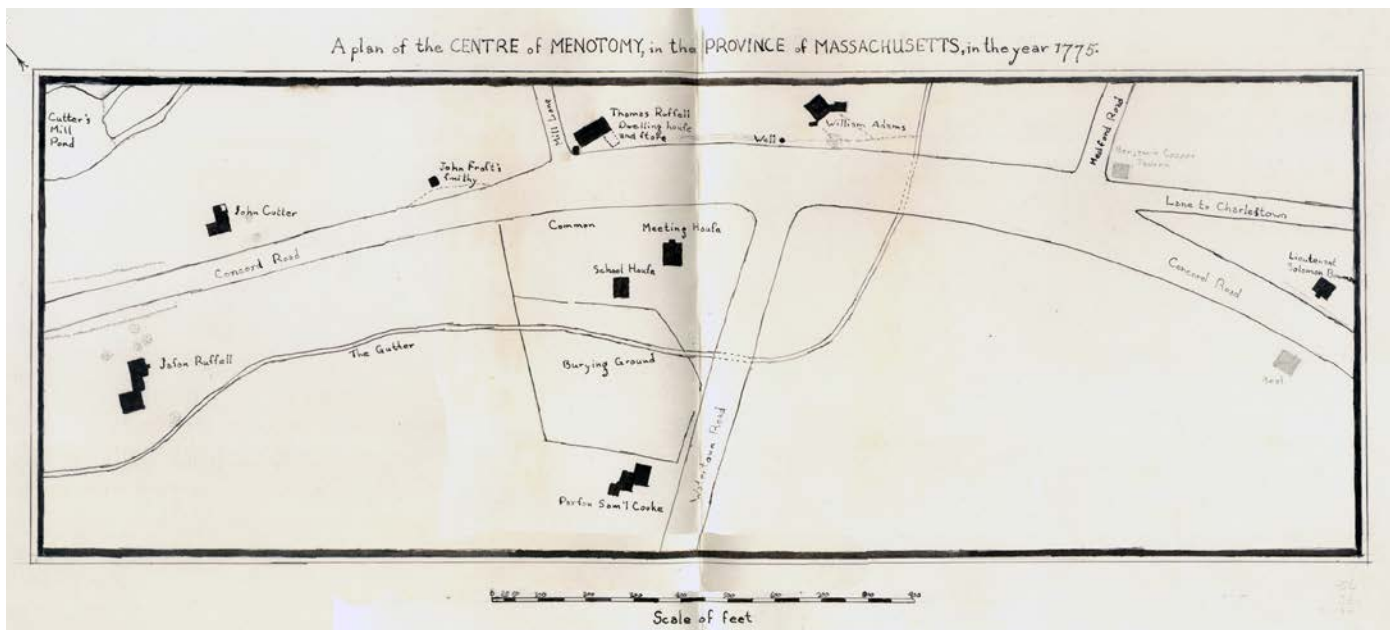
1 PROCESS

The history of the Old Burying Ground has been well documented. Our supplemental research was conducted to gain a greater understanding of the burying ground's physical development. During this research period, we visited Arlington's Historical Society, The Robbins Library and the town of Arlington's Planning Department Archives. We reviewed historic plans, surveys, atlases, aerial imagery, photographs, postcards, and newspapers. We also reviewed written histories, local preservation plans, and relevant master plans. Local historians, maintenance personnel, and neighbors provided further insight into the development of the site. Information regarding the contemporary history of the burying ground was difficult to locate and did not factor into the preservation recommendations.

2 ESTABLISHMENT (1635-1800)

Settlers founded the village of Menotomy in 1635. For nearly a century, these early settlers interred their deceased in the burying ground in Cambridge (what is now Harvard Square). The villagers own burial ground site was selected in 1724, reserved from land owned by Jason Russell. The proprietor's records indicated the townspeople of Cambridge voted "the road leading to Watertown was removed from the northerly side to the southerly side of the land reserved for a burying place." In 1732, after several failed petition attempts to become the Second Precinct of Cambridge, the residents received permission to erect their own meeting house within the burial ground. It is 12 years after the burial grounds designation that we see the earliest date on the gravestone, 1736. The majority of the burials that occurred that year were children.

Providing a proper enclosure for the burial ground was desired during the years of establishment, but its planning proved to be difficult. In 1762, a vote by the townspeople was taken to build a stone wall around the burying ground. Almost a decade later the stone wall had not been completed, but townspeople were solicited to donate stones for its construction and that "any person hath brought stones for the wall to fence the burying-place, shall have the privilege of laying up the stones they have already brought" (Cutter 45). From this description, we understand that the first walls constructed to enclose the burying ground were constructed of dry laid field stone. ➤



Nylander Map, depicting Menotomy Center in 1775

The next 20 years were defined by the events surrounding the Revolutionary War, starting in 1775 with the Battle of Menotomy, which claimed the lives of Jason Russell and 11 other patriots. These patriots were buried in a mass grave in the burying ground “in the clothes in which they fell” (Cutter 70). Many of the British dead from that day were buried in an unmarked grave near the wall in the spot used for the burial of slaves.

A map depicting Menotomy Center in the year 1775 by Nylander reveals “The Gutter”, a seasonal brook that traverses the burying ground presumably where the current gravel path is located. In 1783, a committee was town appointed to complete the wall and to install gates, so that the “burying-place may be sufficiently enclosed” (Cutter 101). In 1799, a vote was taken to build a fence between the burying ground and the Whittemore Estate on the northwest side of the site.

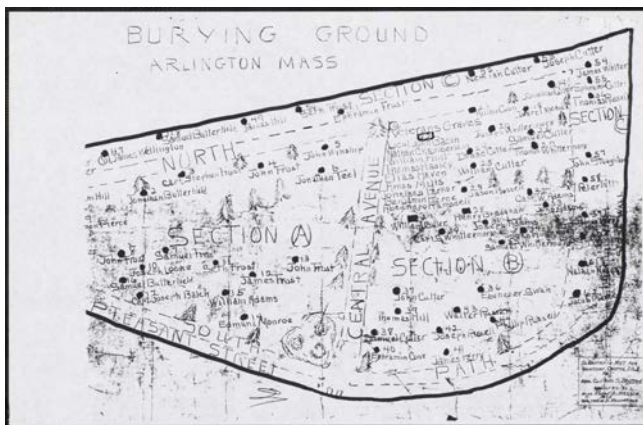
3 ACTIVE ERA (1800-1950)

At the turn of the nineteenth century, the burying ground experienced more active development. In 1807, Arlington was incorporated as an independent town of West Cambridge and several years later, the town voted to allow tombs to be built on the west edge of the burying ground, provided “they should build and maintain a good brick wall” (Cutter 116).

Several structures were introduced to the burying grounds during the first part of the nineteenth century. In 1806, the town voted to construct a building for the Parish in order to ‘deposit a hearse’ on the south side of the ‘Gutter running through the burying ground’ on Watertown Road [present day Pleasant Street] (Cutter 113). Shortly after, in 1810, the town voted to move the Central School House within a portion of the land that was not currently being used for burials. This building remained on the property until 1843. Cambridge artist George A. Frost has painted an image of the burying ground illustrating a schoolhouse on Watertown Road [present day Pleasant Street] framed by a stone wall and a brook, hilly topography and grove of trees in the distance. In “Town of Arlington Past and Present”, Parker describes that “the only shade in the old burying ground at this time consisted of the bunch of willows shown in this picture.” He also suggests that the old hearse house that “stood to the right of the school building” was omitted from the painting as it would have been a distraction (Parker 254).



School in Old Burying Ground in 1810, by Cambridge Artist George A. Frost



1957 Hand Drawn Map of Old Burying Ground
Courtesy of Digital Commonwealth

Records indicate the burying ground was starting to suffer from overcrowding with the development in the first part of the 1800's. In 1831, the town voted to remove the 'old hearse sheds' within the burying ground to capture more space. By 1843, the town purchased the land for Mount Pleasant Cemetery on Medford Street. With this additional land, the rate of burials within the Old Burying Ground slowed significantly. Parker suggests that "the first of the trees now adorning the grounds were planted about the same time the Mount Pleasant Cemetery was prepared for a burying place" (Parker 253). In 1848, the remains of the twelve patriots buried in unmarked graves were disinterred and placed in a stone vault under a new obelisk.

4 PRESERVATION (1950-PRESENT)

Our research found very little information from this period. A hand drawn map from 1957 indicates tree types and locations, paths, significant gravestones and sections located within the burying ground. ➤

5 TIMELINE

Key Dates & Period of Historical Significance

The development of the cultural landscape of Arlington's Old Burying Ground is revealed within its utilitarian features: walls, fences, gates, paths, structures, roads, which all tell the story of how the site was used over time. Towards the middle of the 19th century, the town of Arlington allocated resources to build a substantial wall along Pleasant Street, install new gates, erect a monument, and plant trees, where the Old Burying Ground reached its highest degree of integrity.

This period of historical significance can be used as a reference to guide preservation efforts. It is important to note however, that a single period of historical significance cannot alone guide preservation efforts, as the evolution of the site is not linear and has reacted and responded to the changing needs and changing times. This is evidenced in the following timeline. We use this chronology to help guide our recommendations to preserve and protect this important Arlington resource. ■

- 1635** Menotomy settled in part of Cambridge. Residents used the Burying Ground in Harvard Square, Cambridge.
- 1724** Land that was part of the Russell Property was designated as a Burying Ground.
- 1724** Town voted the "road leading to Watertown be removed from the northerly to the southerly side of the land reserved for a burying-place, Mr. Jason Russell and the neighborhood thereabouts manifesting their desires that it might be so." This road is present day Pleasant Street.
- 1732** Residents of Menotomy successfully petitioned to become the Second Precinct of Cambridge, receiving permission to build their own meeting house.
- 1736** Earliest date on gravestone in OBG in *Town of Arlington Past and Present*, Parker suggests the OBG was already in use.
- 1762** Vote was taken to build a stone wall around the burying ground.
- 1771** Vote was taken to finish wall construction by May 1772, and that 'anyone who had already brought stones, should have the 'privilege' of laying them. (Cutter) with the implication the wall was constructed out of field stones.
- 1772** The Parish appropriated money for the wall at the burying ground.
- 1783** Near end of the Revolution, a committee was appointed to complete the wall and to procure and hang gates so that the burying ground would be 'sufficiently enclosed' (Cutter).
- 1843** Overcrowding of OBG led to purchase of land for the Mount Pleasant Cemetery.
- 1843** Substantial wall built along Pleasant street. Installed new gates.
- 1845** New trees planted in OBG.
- 1848** Erected monument (19' high granite obelisk) honoring Jason Russell and others killed in Menotomy on the first day of the Revolutionary War.
- 1938** Hurricane - fallen trees caused damage along Pleasant Street.

ASSESSMENT

1 GENERAL DESCRIPTION

In January of 2018, an existing conditions survey of the Old Burying Ground and selected tombs at Mount Pleasant Cemetery was conducted by Samiotes Consultants, Inc. The survey documents edge of pavements, utilities, walls, curbing, fences, tree locations, and topography. Relative grave marker locations were added to the survey from a map published in Ivan Myjer's 2007 Condition Assessment report. Over a period of several months, the consultant team visited the burying ground to assess the condition of the grounds.

2 EXISTING SITE CONDITIONS

2.1 LANDSCAPE CHARACTER

The Old Burying Ground is defined by the old stone walls which vary in height and material and provide its enclosure. The site is heavily treed and shady, with large stands of evergreen trees located at its center, and many deciduous trees throughout.

The topography within the walls is generally uneven with leaves and water collecting within the small and irregular depressions. The site drains predominantly from west to east, with higher grades along Peg Spengler Way falling toward Pleasant Street. A broad grassy swale traverses through the middle of the burying ground. Areas of erosion and poor drainage in the burying ground were observed.

2.2 ACCESS AND SECURITY

There are two pedestrian access points into the burying ground, one at Pleasant Street and one at Peg Spengler Way. Rusted metal hinges remain as evidence that gates once existed. The eleven-foot wide Pleasant Street entrance is flanked by two granite posts. The four-foot wide Peg Spengler Way entrance features a granite gate post which at one time supported a gate. A rusted two and one half inch diameter metal pipe located on the opposite side of the entrance was most likely a contemporary improvement installed to secure the former gate. Security has not been an issue. ➤



OBC Walls Vary in Their Construction and Condition; View of Brick, Granite Block and Fieldstone Walls Beyond

Granite posts with rail anchors at the western boundary suggest a former fence ran along this location. The posts are in good condition despite rust stains from the anchors. A four-foot height green chain link fence is set along the border of the Verizon property. It is unclear who owns the fence, but it appears to be located on the abutters property.

2.3 CIRCULATION ROUTES AND MATERIALS

A) PATHWAYS

A centrally located path, labeled 'Central Avenue' on the 1957 map (shown on Page 13), connects the two entrances. The path at the Pleasant Street entrance is composed of a ten-foot wide by thirty-foot length section of bituminous concrete paving in poor condition. Without knowledge of its intended use, we assume this section of paving was added to provide a place for maintenance vehicles to park, however during our site visit a contractor's truck was parked on the grass adjacent to the asphalt.

The majority of the central path varies in width and is composed of compacted gravel with gentle slopes at grades less than 3%. Erosion is evident on either side of the path. Near the Peg Spengler Way entrance, the path rapidly ascends two vertical feet in sixteen horizontal feet. The resultant 12% slope does not meet Americans with Disabilities Act requirements for accessibility.

Vestiges of the lawn paths noted as the North and South Paths' on the 1957 map were observed. There is also a lawn path on the east end of burying ground. All lawn paths are in relatively good condition. No "cow paths" that indicate heavy pedestrian use along desire lines were observed in the burying ground.

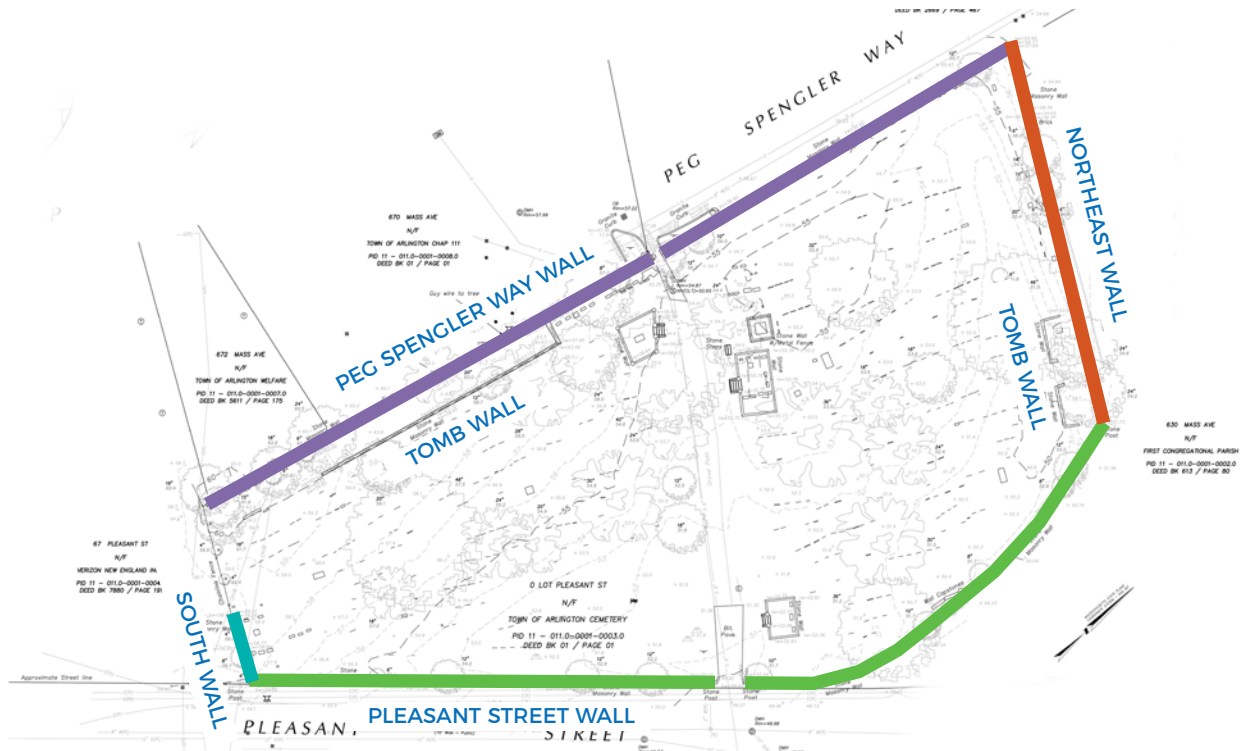
B) STEPS

There are a few granite steps off the central path leading to the Revolutionary War monument. These have settled and are uneven.

2.4 WALLS

The perimeter of the Old Burying Ground is enclosed by varying types of walls, in varying condition, constructed at different times. They are predominantly built out of split block granite, fieldstone and brick. Tomb entrance walls are constructed out of finely cut granite. Some walls are freestanding and others retain earth within the burying ground. Poor repair work on some of the walls is evident. Some of the walls pose safety concerns which are high priority repairs.

Detailed assessments of the walls and tombs prepared by Structures North and Stone Conservationist, Ivan Myjer, are located in the Appendix. A brief summary follows:



OBG Wall Diagram

A) NORTHEAST WALL

The wall along the northeast edge boundary of the burying ground is composed of brick and stone sections. Extensive damage and movement of the wall is evidenced by damaged bricks, joints and bulging. Small volunteer trees and shrubs growing adjacent to the wall have begun to push against the wall and shift the stones. The granite block section has a pronounced outward lean caused by pressure exerted by soil on the inboard side of wall. Outward lean may be reaching critical point where sections of the wall topple. This section of wall is a safety concern.

B) PLEASANT STREET WALL

This wall extends along the Pleasant Street edge and curves to the north moving away from the street. Overall the existing stone wall constructed of split granite block is in good condition with some areas of open and failed mortar joints. On the north side of the Pleasant Street entrance, along the curved section of the wall, there are five coping stones that have been displaced. Four of the coping stones are lying on the ground, some having cracked or broken.

C) SOUTH WALL

There is a low granite block retaining wall located on the east side of this boundary near Pleasant Street. The wall is in good condition.

D) PEG SPENGLER WAY WALL

A three to five foot height field stone wall secures the burying ground border between the northwest corner and the north end of the tombs. This wall changes to brick masonry at the south end. Three quarters of this wall is in poor condition with areas of loose, missing and bulging masonry. Water is entering through cracked and failed mortar, further undermining the integrity of the wall. Substantial moss growth in the mortar joints indicates that the inner mortar has deteriorated to sand. The brick masonry is in a similar state of deterioration as the majority of it is buckled to the point of possible collapse posing serious safety concerns. Roots from volunteer trees have shifted the wall out of plumb, compromising the wall's stability.

Originally dry laid, this wall had no mortar and is not believed to be the height it currently stands. This is a result of efforts to rebuild or restore the wall without consideration of the construction techniques of the past. There are several missing capstones. The capstones located on the ground adjacent to the wall, appear to be from Vermont and are not likely original.





Masonry Side Walls of OBG Northeast Tombs Have Shifted

2.5 MOUND TOMBS

The mound tombs in the Old Burying Ground are a type of crypt construction that was common in New England in the first half of the 19th Century. Mound tombs are crypts that are constructed in the side of a hill, or covered with earth after construction, to form an artificial hill. The construction can either be a field stone mortar laid wall that changes into a brick barrel vault above grade or it can consist of straight sided, mortar laid granite walls that are capped with large flat pieces of granite to form a roof. The OBG contains both types of tombs, while the Mount Pleasant Cemetery contains the latter.

A) OBG TOMBS

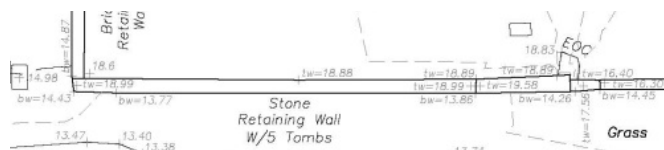
Fifteen tombs line the southern half of the western boundary wall. The southern tomb has a separate front wall which appears to be pulling away from their vaults, leaning slightly. Mortar joints at these tomb walls are in poor condition. A small opening into the southern row tomb is evident. The northern tomb end wall is retaining a small amount of soil and bowing outward. Marble tomb plaques have been set in the brick wall rather than the tombs. It does not appear that tomb side walls have adequate footing as evidenced by the shifting.

Four tombs are located adjacent to the Northeast wall. The front walls of the tombs are in good condition but masonry side walls have shifted. Three of the four metal tomb doors have broken or damaged hinges.

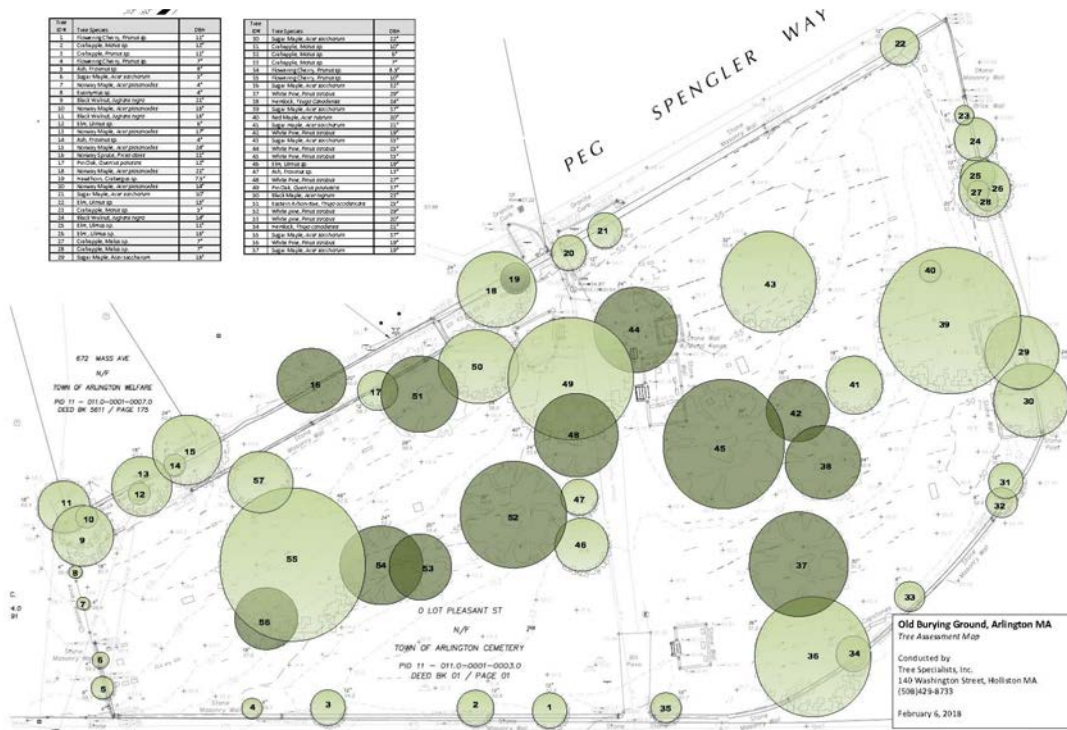
Small movements in the tomb doors allowed for viewing of the interior of two tombs. Wet mortar joints were observed along with open mortar joints in the rear stone wall.

B) MPC TOMBS

The row of five mound tombs are constructed with masonry walls with stone slab ceilings. The top of the tombs are covered with turf and soil. Brick masonry located on the west side wall is failing. There are many open joints that are missing mortar. The front stones are shifting outward. Four tomb doors are rusted and inoperable, and one tomb door is missing.



Five Mound Tombs at Mount Pleasant Cemetery



OBG Tree Inventory: Evergreen (Dark Green Circles) and Deciduous (Light Green Circles)

2.6 SITE AMENITIES

A) TRASH RECEPTACLES AND SEATING

None.

B) SIGNS

There is one older metal sign inside the Pleasant Street entrance that is set on a metal post in the lawn a few feet off of the pedestrian path. Despite facing Pleasant Street, the sign cannot be read from the street, and is oriented away from the path. The sign provides general information about the Old Burying Ground.

B) FLAGPOLES

One unlit white painted flagpole at 25' height is located near the main entrance. The history of its installation is unknown, but appears to be operational and in good condition.

2.7 UTILITIES

A) LIGHTING

The burying ground is devoid of lighting which is appropriate for this historic space. Street lights along Pleasant Street cast ambient light into the grounds. A small light, with historic character, is mounted on a granite post just outside the wall along Peg Spengler Way. It is unknown if it is functional.

B) OVERHEAD WIRES

Two overhead wires cross over the southern end of the burying ground leading from two utility poles located just outside the southwest corner. It is unknown what function they serve.

C) WATER SUPPLY

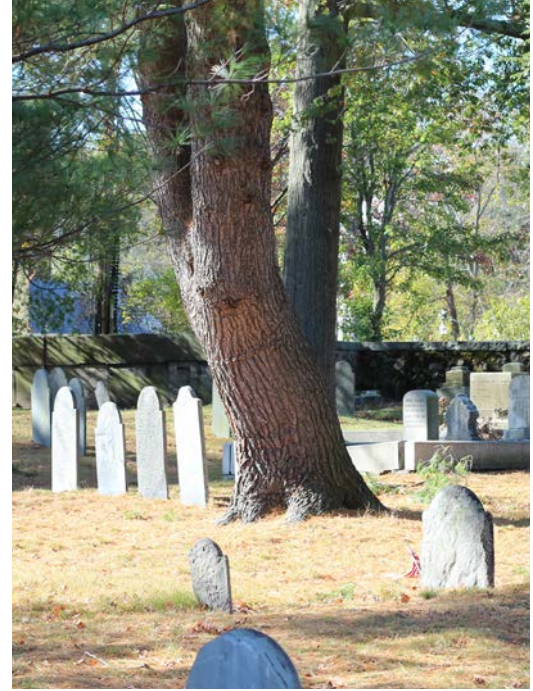
No source of water is located inside the burying ground.

D) SEWER

The presence of drainage/sewage utilities through the burying ground is evidenced by associated manholes. It is assumed that the brook that once traversed the site is piped through the site via the combined storm/sewage pipe.

2.8 SOILS

The soils at OBG are infertile, poorly drained and compacted. These conditions have affected the quality of lawns and the health of trees. A detailed soils report prepared by Pine and Swallow, soil scientists, is included in the Appendix. ➤



OBG Lawn in Poor Condition

2.9 VEGETATION

A) TREES

There are 57 trees located within the burying ground including Pin Oaks, Sugar Maples, Ash, Black Walnuts, Arborvitae, Elms, Hemlocks, Norway Spruce, White Pines, Cherries and Crabapples. Invasive species observed include Mulberry and Norway Maples. The trees vary in condition and have been assessed for safety, visibility into the burying grounds and their impact on structures. Several stumps remain from trees previously removed from the burying grounds. A detailed report conducted by certified arborists is included in the Appendix.

Of the 57 trees assessed: 81% are deciduous and 19% are evergreen, 77% are non-flowering and 23% are flowering, 88% are non-invasive and 12% are invasive. Of the total material, 21% was observed to be growing too close or directly into site walls.

B) SHRUBS

Shrub material was observed along the northern half of the northeast wall. Shrubs are a maintenance concern and are not considered appropriate in this historic landscape.

C) LAWNS

Observations of the area indicate the lawn is not well established. Pine and Swallow evaluated the topsoil and subsurface drainage conditions in relation to the relative success of the turf. Successful turf and optimal growth depend on a number of factors; compaction levels, drainage conditions, planting media, nutrient status and maintenance.

Findings revealed that the primary issue for the poor turf conditions at the OBG is lack of maintenance. pH levels are very low which reduces nutrient uptake and availability of nutrients. Bare ground areas have not been re-seeded and soil fertility is low. Thatch has reduced the ability for root penetration and the grades allow for ponding of water. In addition, the lawn appears to be in shade for many hours of the day.

The soil analysis further reveals that the existing topsoil is too fine grained than typically recommended for parkland, resulting in excess wetness after precipitation events. Topsoil for use in park areas must be well-drained, but also provide adequate organic matter and nutrient holding capacity to support quality turf. Overly dry soil conditions appear to be contributing to failure of turf at the eastern side of the project site.

2.10 MAINTENANCE

Town maintenance of the burying ground includes the mowing of lawns, removal of tree branches, snow clearing and leaf removal. The general appearance of the burying ground is that it is well maintained despite some fallen branches, small leaf piles and pine needles. Grave markers have been repaired on an as needed basis. ■

OBG + TOMBS AT MP CEMENTERY PRESERVATION PLAN



CONDITION ASSESSMENT PLAN

LEGEND

Access & Security

- 1. Pleasant St. entrance - gate missing
- 2. Peg Spengler Way entrance - gate missing, exceeds ADA

Circulation Routes & Materials

- 3. Bituminous path

Structural Elements

- 4. Pleasant Street wall - mortar missing from joints
- 5. Coping stones lying next to wall, some broken
- 6. Northeast wall - stone - area of bulging
- 7. Northeast wall - brick
- 8. Interior tomb walls
- 9. Peg Spengler Way wall - stone - moss growth
- 10. Peg Spengler Way wall - brick
- 11. South wall

Fences

- 12. Granite posts, missing rails

Site Amenities

- 13. Existing sign
- 14. Flagpole

Grading

- 15. Low area

Vegetation & Landscape Character

- 16. Bare lawn
- 17. Trees growing into wall



PHOTOGRAPHS 1 PRESERVATION PLAN



1. Pleasant Street entrance



2. Peg Spengler Way entrance



3. Bituminous path



4. Pleasant Street wall - mortar missing from joints



5. Coping stones lying next to wall



6. Northeast wall - stone, area of bulging



7. Northeast wall - brick



PHOTOGRAPHS 2 PRESERVATION PLAN



8. Interior tomb walls



9. Peg Spengler Way wall - stone, moss growth



10. Peg Spengler Way wall - brick



11. South wall



12. Granite posts, missing iron rail



13. Existing sign



14. Flagpole



15. Low area



16. Bare lawn



17. Trees growing into wall

RECOMMENDATIONS

1 OVERVIEW

The following details our recommendations for the protection, stabilization, preservation and/or restoration of the Old Burying Ground. The general recommendations provided in this section are supplemented by detailed reports included in the Appendix.

2 RECOMMENDATIONS

2.1 LANDSCAPE CHARACTER

Depressions in the lawn should be filled in, to create a smooth even surface. Large deciduous and evergreen trees should remain and pruned to allow for more light to reach the lawn at the ground plane.

2.2 ACCESS AND SECURITY

The Old Burying Ground should remain open to the public. New gates matching the former historic gates should be installed at the entrances only if historic photos are discovered. If historic evidence is not discovered, the wall openings should remain ungated.

The wood rail and granite post fence should be restored at the southern boundary. The chain link fence located on the abutter's property should be removed.

2.3 CIRCULATION ROUTES AND MATERIALS

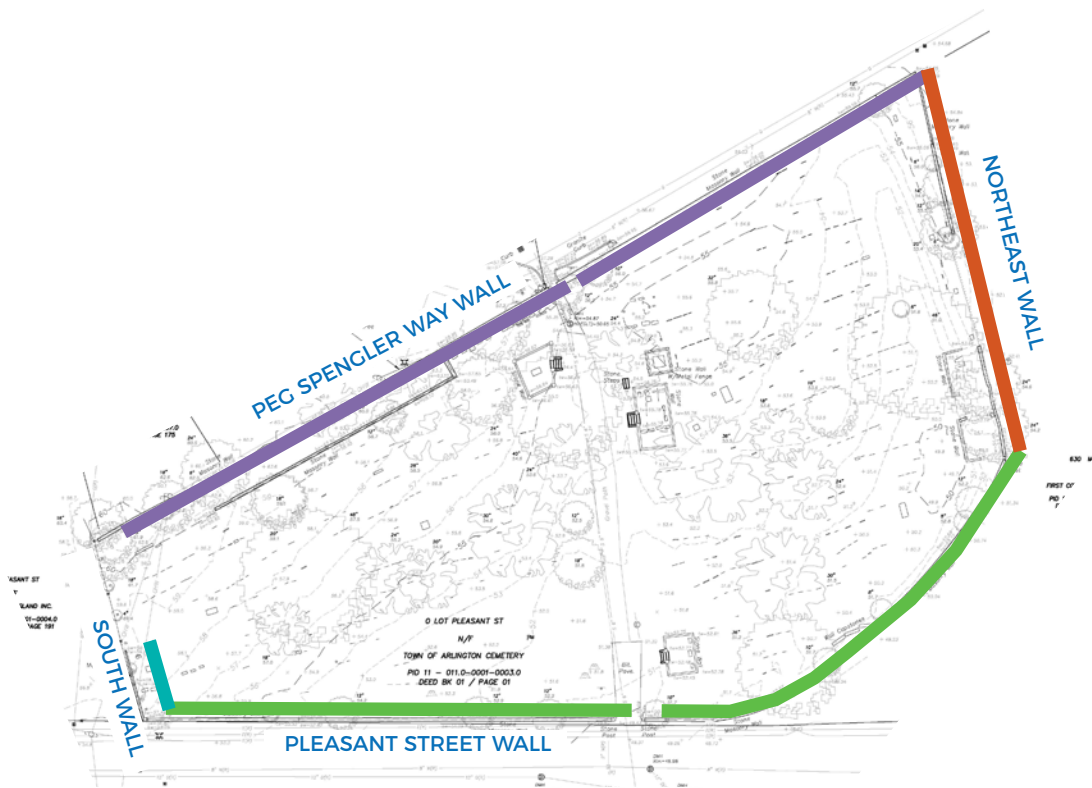
A) PATHWAYS

Central Avenue should be resurfaced with stabilized stone dust and graded with slopes less than 5% to comply with the latest ADA and Massachusetts Architectural Access Board standards. The path should maintain a 5' maximum width, and edged with metal edging. Excavation for new paths should not exceed an 8" depth and care should be given during grading to protect existing tree roots and gravestones. All maintenance vehicles should be kept outside the burying ground.

Secondary lawn paths throughout the Burying Ground should continue to be maintained with regular mowing. Minor areas of erosion should be repaired, by filling with topsoil and seeding as they occur.

B) STEPS

The granite steps at the family plot off of the central path require resetting. >



Wall Diagram

2.4 WALLS

The following summary of recommendations gives an overview of needed repairs for the perimeter walls. The recommended repairs to each section of wall are consistent with the historic character of that section and the manner in which the wall was constructed. The structural integrity for each section should be established in areas where it has been compromised. In all cases, the removal of small trees and shrubs growing in and adjacent to these walls is recommended. Detailed recommendations prepared by Ivan Myjer and Structures North are included in the Appendix.

A) NORTHEAST WALL

The granite block section of the Northeast Wall that has a pronounced outward lean should be disassembled and rebuilt. Granite units should be salvaged and reset in their original position with an appropriate footing installed. Reset granite blocks that are out of plumb and repoint the remaining stable sections of the granite block wall. Rebuild brick sections of the wall have portions that are missing or toppled with matching brick. Remove shrubs growing into the wall. Coordinate wall work with tomb repairs. Wall work adjacent to tombs shall follow recommendations per the 'Addendum to 2018 Arlington's Burying Ground Tomb Assessment Report' located in the Appendix.

B) PLEASANT STREET WALL

Repair and reset displaced coping stones. Repoint open and failed mortar joints in granite block stone or between stones and coping stones with matching mortar. Remove soil and debris from under coping stones and repack the void with granite shims and mortar.

C) SOUTH WALL

No work to the low granite wall is recommended.

D) PEG SPENGLER WAY WALL

Rebuild portions of the wall that are in poor condition from below grade. Remove and salvage wall stones and coping stones for reuse. Rebuild this wall with a concrete core and footing, using existing stones as veneer. Remove failing mortar and repoint with historically appropriate mortar and joint profile from stable wall sections to remain.

Dismantle unstable brick portions of wall and rebuild using salvaged brick and salvaged granite coping stones. Reset marble plaques in their original position. Wall work adjacent to tombs to follow recommendations per the 'Addendum to 2018 Arlington's Burying Ground Tomb Assessment Report' located in the Appendix.



Existing Sign

2.5 MOUND TOMBS

A) OBC TOMBS

Remove trees and shrubs growing on top of the tombs or adjacent to them. Maintain lawn cover at tomb fronts and side slopes and replenish soil as needed.

Reconstruct unstable tombs and repoint remaining walls. Fill large gaps in tomb walls as required with stones and soil. Comply with state regulations on the handling of human remains prior to reconstruction work. All work to follow detailed recommendations per the 'Addendum to 2018 Arlington's Burying Ground Tomb Assessment Report' located in the Appendix.

B) MPC TOMBS

Reconstruct unstable tombs and repoint remaining walls. Fill large gaps in tomb walls as required with stones and soil. Comply with state regulations on the handling of human remains prior to reconstruction work.

2.6 SITE AMENITIES

A) TRASH RECEPTACLES AND SEATING

Do not provide seating and trash receptacles inside the Old Burying Ground.

B) SIGNS

The existing sign within Old Burying Ground should be repaired and refinished and remain in place. New signage should include identification, regulation, orientation, and interpretation and should be located outside the burying ground entrances.

C) FLAGPOLES

The existing flagpole should remain in situ and refinished as long as flag protocols are followed. If not, the flagpole should be relocated to another suitable location.

2.7 UTILITIES

Reset all utility manhole frame and cover elevations within the Central Path to meet new grades.

A) LIGHTING

Lighting within the Burying Ground would be inappropriate and should not be added.

B) OVERHEAD WIRES

Relocate overhead wires to outside the Old Burying Ground.

C) WATER SUPPLY

A new water supply is not recommended inside the Burying Ground.



D) SEWER

Provide a new manhole cover at the existing sewer manhole with historic information about the 'Old Gutter'.

2.8 SOILS AND LAWNS

Protection of headstones is paramount to protect delicate resources during lawn renovation. Fill existing depressions in existing lawn areas to create smooth and even surfaces. No excavation is permitted without supervision from a licensed archeologist. Remove thatch from existing lawn areas. Amend soils to promote lawn growth. Sow shade and drought tolerant seed mixtures in disturbed areas.

A detailed soils report prepared by Pine and Swallow is included in the Appendix.

2.9 VEGETATION

A) TREES

Provide a crane outside the burying ground for all tree work and protect headstones from damage with plywood. Remove tree limbs posing safety concerns and invasive trees and trees growing near walls and tombs. Treat trees for control of insects and disease and remove trees as detailed in the Tree Assessment Report prepared by the Tree Specialists, located in the Appendix.

B) SHRUBS

Remove all shrubs from the Burying Ground. ■

3 PRIORITIES AND COSTS

The following budget presents opportunities and estimated costs for all capital improvements delineated in these recommendations. Items are listed in approximate order of priority in 2018 dollars.

HIGH

Repair/rebuild northeast wall *	\$182,800
Repair/rebuild Peg Spengler Way wall *	\$1,506,300
Repair Pleasant Street wall *	\$16,600
Repair tombs at OBG	\$262,200
Remove selective vegetation	\$9,000
Provide ADA compliant path	\$20,000
Prune trees	\$27,000
	\$2,023,900

MEDIUM

Reset granite steps	\$900
Repair tombs at MPC	\$26,800
New trees	\$15,400
Restore lawn	\$20,000
	\$63,100

LOW

New granite posts at entrances	\$4,500
New wooden rail fence	\$1,200
Relocate overhead wires	\$2,000
Provide new signage	\$5,000
New decorative utility cover	\$5,000
	\$17,700

TOTAL	\$2,104,700
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* The wall estimates reflect the highest value in a range of costs for repairs presented by Structures North. For a detailed description of the work and the associated price range, see their full report located in the Appendix.

RECOMMENDATIONS MASTER PRESERVATION PLAN



- LEGEND**
- Access & Security**
- 1. Restore granite posts
 - 2. Address boundary
- Circulation Routes & Materials**
- 3. Install ADA compliant path
 - 4. Reset granite steps
- Walls**
- 5. Northeast wall, rebuild, repoint
 - 6. Pleasant Street wall; repoint, reset coping stones
 - 7. Peg Spengler Way wall; rebuild, repoint, reset coping stones
 - 8. Repair and repoint tomb walls
- Site Amenities**
- 9. New signage
 - 10. Refinish flagpole
- Utilities**
- 11. Relocate overhead wires
 - 12. Adjust/replace utility cover
- Soils & Lawns**
- 13. Repair lawn
- Vegetation**
- 14. Remove shrubs
 - 15. Remove volunteer growth along perimeter walls
 - 16. Remove invasive trees



MANAGEMENT

1 OVERVIEW

The importance of the Old Burying Ground to the Arlington community is reflected in well-kept lawns, other components kept in a good state of repair and an inviting informative sign system. A well maintained site tends to discourage vandalism. The following maintenance management guidelines should serve as a general guide. Specific changes in these recommendations may be required over time. Primary responsibility for this maintenance is with the Town of Arlington.

2 MAINTENANCE MANAGEMENT

2.1 GENERAL CLEAN UP

Leaves, paper, trash or debris should ideally be removed on a weekly basis. Leaves should be removed during the fall and the grounds cleared of fallen branches.

2.2 CIRCULATION

Existing paved areas should be kept free of snow and ice and remain passable at all times and as safe as possible. Spread sand on icy spots and steps. The use of excessive amounts of salt for deicing is not recommended because it is toxic in excessive quantities to trees and other vegetation. Repair cracks every 5 years or until stone dust path is installed.

Once the stone dust path is installed, clean paths twice a year. Rake stone dust as needed to smooth out any depressions that may have occurred. If sections of the path become significantly depressed, or washouts occur, replenish the stone dust and re-compact in an even manner. Add a new layer of compacted stabilized stone dust to the cemetery paths every five years. ➤



2.3 WALLS

Because the Old Burying Ground is located in a northern temperate climate, structural elements are subject to a wide range of temperatures. This thermal stress requires regular examination and subsequent maintenance of structural elements. Inspect for cracked mortar, loose bricks, broken stones and other movement annually.

2.4 MOUND TOMBS + MARKERS

Remove vegetation from top of mound tombs and maintain lawn.

The deterioration of the markers at the Old Burying Ground is evident. Stone is subject to natural weathering, which has become accelerated by atmospheric pollution. Porous stones like marble, sandstone and limestone are more subject to the effects of weathering than nonporous stones like granite. The prohibition of gravestone rubbings should be continued because the process can leave wax or ink and cause surface losses. Inspections should be conducted every season to check for damaged stones and any other cases of accelerated deterioration due to weather and vandalism.

Fallen or tilting headstones should be reset in an upright position. Left in place, a leaning headstone is more liable to be damaged by lawn mowers. Deterioration may be accelerated because they may absorb moisture from the ground or collect rainwater.

2.5 SITE AMENITIES

A) SIGNS

The sign should be cleaned annually and refinished as needed.

B) FLAGPOLE

The American Flag should be raised daily or displayed only on holidays. If the American Flag is left flying at night, it must be lit. The flagpoles should be assessed annually for structural and paint integrity. Repair as needed.

2.6 VEGETATION

A) SOILS

Soils should be monitored and tested for pH and fertility every 3 to 5 years to determine fertility changes made with basic treatments and to give a bench mark for further soil improvements. It takes 3 to 5 years for the soil and the basic treatments to reach equilibrium.

Liming: Lime serves several important functions. It is of particular value in correcting the acidity of the soil. It also changes the structure of the soil, hastens bacterial action in the soil, aids in the liberation of plant foods



which otherwise remain in the soil in unavailable form, hastens the decomposition of organic matter and supplies a small amount of calcium, which is one of the essential plant foods. Ground limestone should be applied every 3 to 5 years as required to bring lawn areas to the preferred 6.0–6.5 pH level. If a lime application is necessary, apply it 2 to 3 weeks prior to fertilizing. Lime should not be used in combination with animal manures or with nitrogenous fertilizers, as it causes the rapid release of ammonia. Lime should be applied either in early spring or late fall, with early spring (April) preferred.

Fertilizing: Soil tests are required to determine fertilization needs. Lawn areas should be fertilized a minimum of twice a year to maintain a healthy lawn. Light, frequent applications of readily available Nitrogen fertilizers are preferred over heavy, infrequent applications. Lawns in this area generally require 0.5 pounds of Nitrogen per 1,000 square feet per growing month. The chemical formulation of all fertilizers proposed for use should be checked by a stone conservator prior to use to prevent potential damage to gravestones and other artifacts. Fertilizer should be applied with a mechanical spreader when turf is dry. This work should be either contracted out by the Town or performed by Town maintenance crews.

B) TURF MANAGEMENT

Seed is recommended for establishment of lawn. Seed mixes should incorporate improved low maintenance, drought resistant and shade tolerant seed varieties. The best time to plant a lawn is between August 15 and October 1 to reduce weed infestation and maintenance requirements.

Rehabilitating existing lawn areas: The lawn in historic burying grounds needs to be rehabilitated with care because of gravestone and bone fragments just below the surface of the ground. Weed species should be removed. The soil should be loosened by power rake or hand raking. Rototilling is not recommended because of potential damage. Fertilizer and lime should be added as recommended by soil analysis. Mounds should be regraded and depressions filled with topsoil. Bare spots should be seeded, top-dressed and rolled. Water must be provided to maintain a sufficient moisture level to establish grass. Protect existing gravestones during these operations. ➤



Mowing: Mow every ten to fourteen days to an average height of 3 inches. The most serious issue is the routine removal of grass in the immediate vicinity of gravestones and tombs. Power mowers can scar and break stones. The types of stone used in gravestones tend to be softer and more easily damaged than granite. The best current solution is to mow with lawn mowers to within twelve inches of gravestones and tombs and then use weed whips [rotating nylon filament trimmers] to trim the remaining area. The use of weed whips is permissible at granite and brick, using the thinnest string (.80) available. Metal hand trimmers should not be used because they can abrade stone. At the marble gravestones, and perhaps slate, grass should be removed from the bases of the stones using hand trimmers to maintain a vegetative free zone adjacent to gravestones.

2.6 VANDALISM

Vandalism and other problems should be reported promptly to the Town of Arlington. ■

APPENDIX

A-1 BUILDING AND MONUMENT CONSERVATION Structural Report

Conditions Assessment Report for the Markers,
Tombs and Walls in Arlington's Old Burying
Ground.

Conditions Assessment of Five Contiguous Tombs
located in Mount Pleasant Cemetery, Arlington,
MA.

Addendum to 2018 Arlington Burying Ground
Tomb Assessment Report.

A-33 PINE & SWALLOW Soils Report "Limited Field Investigation"

A-61 SAMIOTES CONSULTING, INC. Topographic Plan of Land

A-63 STRUCTURES NORTH Structural Report

Old Burying Ground, Arlington, MA.
Structural Conditions Assessment.

Mount Pleasant Cemetery, Arlington, MA.
Structural Conditions Assessment.

A-68 TREE SPECIALISTS, INC. Tree Assessment and Recommendations.

A-75 SELECTED BIBLIOGRAPHY

Conditions Assessment Report For the Markers, Tombs and Walls In Arlington's Old Burying Ground

Executive Summary

In the fall of 2017, Building and Monument Conservation was retained by the Town of Arlington to update the Conditions Assessment Report of the structures located in the Old Burying Ground completed by Building and Monument Conservation in 2008. The focus of the 2017 update was on the reassessment of the tombs and the perimeter walls, but the grave markers and monuments were also reviewed.

Review of grave markers

In the nine years since the previous assessment, a significant amount of work has been completed towards the repair and maintenance of grave markers. Many of the highest priority markers identified in the 2008 report have been repaired and reset. A handful of markers remain to be addressed but, as many of these are located along the perimeter of the burying ground adjacent to the walls that also need repair, it does not make sense to repair or reset these markers until the much-needed work on the perimeter walls has been completed. The markers closest to the walls will need to be removed while the walls are being repaired and placed in storage – preferably within the burying ground. The location of each stone that is removed should be marked on the map created specifically for the 2018 Master Plan.

March 2018 Tomb Reassessment

Overview of Construction

The mound tombs in the Old Burying Ground are a type of crypt construction that was common in New England in the first half of the 19th Century. Mound tombs are crypts that are constructed in the side of a hill, or covered with earth after construction, to form an artificial hill. Typically, the entire structure, with the exception of the front wall, is covered with soil that is seeded with grass or other plants in order to keep the soil from eroding. The purpose of the sod is to protect and stabilize the masonry. The vault generally takes one of two forms. It can either be constructed with field-stone walls and a brick vault that begins below grade or it can consist of mortar laid coursed granite walls that are capped above grade with large flat pieces of granite to form a roof.

The Arlington Burying Ground contains both types of tombs. Looking from the exterior, it is not always easy to tell which tombs contain brick vaults and which are roofed with granite slabs unless the soil has eroded and the structure is exposed. The freestanding tombs on the north side of the burying ground have brick vaults while the row of contiguous tombs on the west side have flat granite roofs. The front walls of the tombs in the OBG are very similar to each other in terms of style and construction regardless of the



type of construction used to form the crypt. The tomb fronts at the OBG are very plain without inscriptions or ornamentation. The fronts are constructed from three massive granite slabs – two that form the wall on either side of the door and one that spans the top of the door opening.

To construct a mound tomb, a hole was dug into the side of a hill, or into the ground and then a foundation was laid for the four walls. On top of the foundations, walls were constructed either from rubble stone or cut blocks set in mortar. For tombs with brick barrel vaults, the spring line of the vault was started below grade so that the earth could act as a restraint for the vault - to resist the natural tendency of arches to spread. For tombs with granite roofs, the walls were extended about two feet above grade and then the long pieces of granite were set across the side walls. The massive pieces of granite that form the front walls were set in front of the granite roof or brick vault with the upper lintel unit projecting at least a foot above the roof in order to form a forward barrier for the sod. The floors were usually created from tamped earth or brick about four feet below grade. The interior walls were parged with lime stucco and/or whitewashed. At the end of a line of contiguous tombs, or on either side of a single tomb, stone retaining walls were laid to keep the sod from eroding down the steep sided mound formed by the tombs.

Town records as codified in “History of the Town of Arlington, Massachusetts 1635-1879” by Benjamin and William Cutter” state that “permission was granted in 1810 to the inhabitants of the parish to build tombs in the northerly part of the cemetery on condition provided that they also “build and maintain a good brick wall on the same” The walls currently behind the tombs on the north are granite but there are brick walls a bit further to the west which are currently lying on the ground.

There is a remarkable consistency from burying ground to burying ground throughout New England in the dimensions of the crypts and the manner in which they were constructed. The interior space is always entered through a narrow door just wide and tall enough to allow a casket to be slid in. Usually, but not always, there are steps down to the floor constructed from brick or granite blocks. The doors were often set on cast iron hinges placed in holes drilled into the granite and secured in place with molten or tamped lead. Doors constructed from slabs of marble or bluestone were common in the early 19th century though less of these have survived than the iron doors because of the fragility of the stone.

Some tombs were constructed with stone shelves built into the interior walls to support the caskets. Others were constructed with low stone dividers onto which the caskets were stacked while others do not have any casket supports at all.

All of the tombs that were examined in the Arlington Burying Ground contained human remains but only fragments of the wood caskets. The Seth Wyman tomb contained at least nine adult skulls. In all cases, the human remains were scattered around on the floor making entry very difficult.

Conditions:

The interiors of the three tombs that were entered in 2008 were in very good condition at the time. A re- inspection of the Seth Frost and James Hill tombs in 2018 did not find any changes to the conditions.

Front Walls of Tombs

Mound tombs generally have a common problem that is a direct result of the manner in which the front walls were constructed. The problem is more acute in tombs with brick vaults than those with granite roofs because the builders did not have an adequate way of anchoring the front wall of the tombs to the masonry that forms the brick vaults. When anchors between the front walls and the vaults were used, they were generally long wrought iron rods secured to the front wall units at one end and to the granite slab roof or the brick vault at the other. This worked reasonably well for granite roofed tombs where the anchor could be set into a hole in the granite but the brickwork in the barrel-vaulted tombs provided less of an opportunity to make a durable connection because, while granite works well in tension, the lime mortar between the bricks in the vaults does not. A second issue that affect both types of tombs is that over time, the wrought tie iron rods eventually corrode and fail.

As a result of this fundamental design flaw all of the front walls of the tombs in the Arlington OBG are pulling away from the brick or stone vaults. The forward tilt of the walls has resulted in a gap between the sides of the vault and the front walls as well as between the top of the vaults and the front walls. In Arlington the problem is not yet acute enough to warrant rebuilding of the front walls.

The builders of the contiguous tombs on the west side of the burying ground attempted to compensate for this problem by anchoring all of the front wall capstones to each other with iron cramps. While these anchors certainly slowed the rate of movement they were not able prevent it and all of front walls on the west tombs have tilted forward.

The problem is more acute on the north elevation because as noted earlier, the brick vault construction provided less opportunity to anchor the fronts to the vaults.

The top of the walls tend to move away from the vaults because of a combination of factors ranging from settling of the foundation to ice forming in the wet soil behind the cap stone. As the wall moves outward the rate of movement slows considerably because, as the gap widens, less water is trapped. The flow of water through the gap between the capstone and the vault however can be detrimental to the foundations and floors of the tombs.

The problem can be addressed in the early stages of movement by installing anchors and sealing the gap with masonry. In the advanced stages, there are few options other than taking the front walls apart and rebuilding them with anchors.



Rear Walls of Tombs:

In 2008, problems were noted at the perimeter walls of the burying ground but there was some uncertainty as to how these problems might be impacting the structure of the tombs. To clarify the relationship between the rear walls of the tombs and the perimeter walls that abut the tombs, a series of probes and investigations were undertaken as part of the re-evaluation of the tombs in 2018. The results of the investigation are contained in the addendum to this report.

Retaining Walls on the Sides of the Tomb:

The side walls of the mound tombs are important because they function as retaining walls to keep the soil on top of the vaults from washing down the steep slopes of the mound. These walls vary in the way they were constructed as well as in the materials that were used. Not all of the side walls appear to be original.

It does not appear that any of the sidewalls were constructed with an adequate footing – a factor in why all of them have shifted. The tomb sidewalls can tolerate a certain amount of displacement and still function as intended because the soil fills the gaps created by the wall movement.

The north retaining wall on the row of tombs on the west perimeter of the OBG is very close to collapsing. The wall is very bowed and the coping stones on top of the wall have fallen on to the roof of the first tomb.

Recommendations:

General:

1. Remove trees that are growing on top of the tombs or adjacent to them.
2. Initiate a monitoring system to monitor the outward movement of all the tomb fronts. A yearly tape measure survey would suffice if the measurements were taken using fixed points on the wall and on top of the tombs.
3. Keep all tombs permanently covered with soil and grass. Replenish sod that has eroded on an annual basis.

Priority 1

- Repair the north sidewall on the west tombs by dismantling and rebuilding.
- Repair the perimeter wall that forms the rear wall for the west tombs by dismantling and rebuilding the displaced sections of wall. (See addendum for specific repairs to the west perimeter wall.)

Priority 2

- Repoint the west perimeter wall sections that do not require rebuilding.
- Rebuild low side walls that are displaced.

- Install additional flat stones and soil in the gaps where the front walls have been displaced.

Note on Working with Human Remains

All of the tombs very likely contain human remains. In the tombs that were inspected, the remains were scattered on the floors of the tombs. If the west perimeter walls are part of the structure of the tombs, steps will have to be taken to either remove, cover or bury the remains before work can commence.

Introduction to Perimeter Wall Assessment

In 2008, Building and Monument Conservation completed an assessment of the perimeter walls of the Old Burying Ground in Arlington. In 2017 we were asked by the Town of Arlington to update that assessment. A resurvey was undertaken in Feb of 2018.

Aside from a very small amount of work on the west elevation adjacent to the gate, no work has been completed on the perimeter walls in the intervening ten years. The conditions however have gotten dramatically worse in every respect. Walls that were beginning to lean are now leaning dangerously. Trees adjacent to the walls that were starting to displace masonry are now larger and the amount of displacement has grown.

As a result of the resurvey, the priorities and recommendations from 2008 have revised. In 2008 the walls with the greatest need for repair were labeled “high” priority. In 2018 sections 1,2 and 5 have been reprioritized as “urgent/critical” because not only is the historic fabric in danger of being lost but the collapse of the wall by collapsing could represents a safety hazard.

In 2008 there was a concern that the section of wall along the west elevation directly behind the mound tombs on the west elevation was also part of the structure of the tombs. In 2018 the interior walls of the Seth Frost and James Hill tombs were examined, and probes were undertaken from the interior and exterior. The results of that examination are contained in the addendum to this report along with a section by section description of the work that is required.

General Recommendations

1. Remove all trees and shrubs that are adjacent to the walls and/or close enough to the walls to damage them as they mature. Smaller/desirable trees can possibly be replanted further from the walls.
2. Work with a civil engineer to determine the extent and condition of existing subgrade wall footings. For sections of the wall that have to be rebuilt, the engineer can determine of the existing footings can be reused or must be replaced.
3. Work with a historic masonry specialist to specify the means and methods to retain the historic integrity for sections of the wall that have to be rebuilt or

repaired. The historic masonry specialist will specify a historically appropriate mortar, mortar profile, mortar tooling and color.

4. Evaluate state archeological requirements in locations where subsurface work is to be completed.

Overview

The perimeter of the Old Burying Ground is enclosed by several types of stone wall - each constructed at a different time. The earliest surviving section may be a small portion of collapsed brick wall along the north side of the burying ground. The rest of the wall sections appear to have been constructed during a 110-year period beginning around 1840 and ending around 1950. There was a partial reconstruction of a small section of wall along the west perimeter in 2006 but not additional work has been completed since then.

It is difficult to match the existing walls to the dates in the historic documentation. For example, town records state that in 1767 a vote was passed to fence the burying - place with a stone-wall and do it by subscription. In 1771 the minutes state that it was voted that the wall to fence the burying-place be accomplished in twelve months from May 27, 1771. In 1783, a committee was chosen to complete a wall around the burying place and also empowered to "procure gates and hang the same so that said burying place may be sufficiently enclosed". It is not clear if the walls were built in 1783 because in 1843, town records state that "a good and substantial stone wall was built around the new and old cemeteries ...with suitable gates." The curved wall along the east perimeter is a "good and substantial stone wall" but the style of the granite work is more in keeping with granite walls from the 1860's than with those from the 1840's.

Generally, walls can be dated by the type of setting mortar or the complete absence of mortar but, as all of the existing wall sections contain modern Portland Cement mortar, it is difficult to determine if a particular section of wall has simply been repointed in the 20th Century with cement mortar or if it is an entirely new wall. While it is possible that some sections of the existing stone walls along the west boundary were constructed in the 18th or 19th centuries, it is more likely that the stones from earlier walls were incorporated into the later walls. As noted previously, only the fragments of the collapsed brick wall along the northern boundary appear to be traceable to a specific reference in the town records as permission was given in 1810 to construct tombs along this side of the burying ground as long as a brick wall was also constructed behind the tombs.

The perimeter walls vary considerably in the manner in which they were constructed but not in the type of materials that were used to construct them. The predominant material is granite or in some cases granitic field stones. After granite the only other major wall component is brick. The manner in which granite was used to construct the walls is a study in the use and working of this stone. For example, the south perimeter boundary consists of granite posts that were worked by hand to produce narrow sections that project from much larger sections below ground. These above ground sections still contain the wrought iron attachments for wooden rails. The east wall that curves to form part of the north wall is constructed from pieces of granite that were worked by hand to

produce relatively flat top and bottom beds with sides that are perpendicular to the beds. The stones on the west wall, in contrast, are either exactly as they were found in nature or minimally worked. The cap stones on the east wall were extensively worked by hand to produce a sloped wash surface as well as rockfaced sides with tooled margins. Those on the west wall however were simply split with plugs and feathers and mauls; no attempt was made to work the stones further. The west wall, which is laid up in cement, is probably later than the east wall but it is very possible that the cap stones on the west wall predate those on east wall. As with so many structures in New England, the cap stones could have been salvaged and re-used from an earlier wall located either at the burying ground or in some other place.

All of the walls serve to mark the boundaries of the burying ground and some may serve additionally as retaining walls or, as the rear support walls of in-ground tombs constructed parallel to the walls. It is not clear that all of the sections that are currently serving as retaining walls were constructed with that use in mind. It is very possible that the grade inside the burying ground was changed so that it is higher on the inner side of the wall now than it was when the walls were constructed. This change in grade could account for some of the bowing and outward lean of the walls.

The end walls of the tombs that form the boundary on the southern extent of the west wall have an unfinished quality about them that suggests that they were not originally intended to be seen. These wall sections were constructed primarily from brick with occasional sections or courses of split granite. It is possible that there was at one time an outer facing of stone or soil that was removed when the adjacent parking lot was constructed.

Since there is no single wall type, there can be no single recommendation for the repair, restoration and maintenance of the perimeter walls. While there are some common causes of deterioration such displacement resulting from the growth of trees and shrubs adjacent to the walls, there is no single remedy. The repairs to each section of wall must be consistent with the historic character of that section and just as importantly the manner in which the wall was constructed. In many cases, the repairs that have been made to the walls in the last seventy to eighty years have undermined not only the historic appearance of the walls but also their structural integrity. This has been done by introducing mortars into dry laid walls or by introducing cement mortars into walls built with earlier lime-based mortars. In some cases, these interventions can not be reversed and there is no choice but to continue to maintain the walls in the same manner as they have been since Portland Cement was introduced.

The side walls at the ends of the row of tombs on the west elevation run perpendicular to the perimeter wall and appear to be attached to the perimeter wall. The condition of these walls has deteriorated significantly over the last ten years. These walls are critical for preventing soil erosion and maintaining the historic appearance of the tombs, but they are not critical to the structure of the tombs. In contrast, the side walls of the tombs on the north elevation tombs the walls may be providing some structural stability for the brick vaults within the tombs in addition to keeping the soil cover over the tombs from eroding.



A consistent layer of soil cover is vital for the stability of the brickwork as the soil insulates the bricks and mortar from freeze-thaw damage and erosion of the mortars.

Section by Section Conditions Assessment and Treatment Recommendations

The Arlington Burying Ground perimeter walls change in terms of materials, type of construction and/or condition every 50 to 100 feet. The varying wall types and conditions warrant separate assessments and treatment recommendations for each section of wall. The burying ground map created for this project contains a key to the section numbers below. The recommended repairs described for each section could in most cases form a discrete project or could be combined with repairs to other sections to form a larger project, depending on the available funding.

Section 1: North Elevation with slight return on West. Ref 2008 map for exact location

Description of Materials and Construction

- Split granite block construction.
- Holes from plugs and feathers - a type of tool used to split granite visible at edges of blocks.
- Wall functions as retaining wall.
- Top and bottom beds of blocks worked to a smooth finish.
- Sides (joints) perpendicular to beds.
- Faces of blocks split and pitched.
- 3 Wrought iron cramps – a type of anchor – visible at top of wall.
- Blocks set in Portland Cement mortar and pointed with cement mortar indicating possible 20th century construction or rebuilding.
- No coping stones at top of wall – water entering through upward facing joints.

Condition of Wall

- Pronounced outward lean to the wall caused by pressure exerted by soil on the inboard side of the wall. Outward lean has increased dramatically over the last ten years and may be reaching critical point where sections of the wall topple.

Recommended Repairs

1. Disassemble approximately 35 linear feet of this wall, salvage granite units and reset them in their original position using concealed stainless steel anchors.
2. Condition of existing footing has not been determined. A new footing may be required.
3. Repoint sections of the wall that are not rebuilt.

Section 1 Priority – Urgent/critical

Section 2: West Elevation. Please see 2008 map for exact location.

Description of Materials and Construction

- Rubble wall construction with split granite coping stones.
- Constructed from two wythes of granitic and shale fieldstones with small stones set in center.
- Inner and outer facing wythes are pointed with cement. Small stones set between the inner and outer wythes that are not packed with cement.
- Given the absence of mortar at the inner core it is possible that the wall was constructed with lime mortar that washed away over time. To stabilize the wall it was then packed with cement mortar from both sides. The relative height of the wall (+/- 60") compared to its thickness however is unusual for either a dry laid wall or a lime mortar set wall – it is also possible that the wall was originally constructed as it appears now.

Condition of Wall

- Bowing and displacement of wall as well as cracking and debonding of mortar joints has increased dramatically over the past ten years.
- Wall is displaced in two areas by trees.
- Section at north end of wall is in danger of collapsing.
- Tree root infiltration at foundation/footing level is undermining the integrity of the wall.
- Multiple generations of repointing mortar are visible.
- Virtually all mortar is de-bonded and no longer functioning as intended.
- Water is entering through cracked and failed mortar and further undermining the integrity of the wall.

Recommended Repairs

- Remove trees and roots adjacent to wall.
- Rebuild entire wall from below grade – Roughly 150 linear feet of wall.
- Number, remove and salvage coping stones for reuse.
- Remove all markers adjacent to wall prior to starting any work and store in a safe location for reinstallation in original location after wall rebuilding is complete.
- Salvage all wall stones for reuse.
- Evaluate rebuilding wall with poured concrete core and original stones as facing on either side.

Section 2 Priority – Medium High overall. For northern portion of this wall in danger of collapse, the priority is Urgent/Critical.

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Section 3: West Elevation. South of entrance. Roughly 52 feet from entry to side wall of tomb. Please see map for exact location.

Description of Materials and Construction

- Rubble wall construction with split granite coping stones identical to section 2 (except for recently rebuilt portion)
- Constructed from two wythes of granitic fieldstones with small stones set in center.
- Inner and outer facing wythes are set in cement with small stones set between the wythes that are not packed with cement.
- Section adjacent to opening rebuilt circa 2006

Condition of Wall

- Wall displaced by tree at mid section.
- Tree root infiltration at foundation undermining wall.
- Multiple generations of repointing mortar.
- Virtually all mortar is de-bonded and no longer functioning as intended.
- Water is entering through cracked and failed mortar and further undermining the integrity of the wall.
- Section at north adjacent to opening in wall rebuilt with modern Portland cement mortar. Granite cap stones were lost while in storage. New matching cap stones required.

Priority Section 3 – medium. Additional Repairs – located in addendum

Section 4: West Elevation. From start of tomb to transition to brick and stone. Please see map for exact location

Description of Materials and Construction

- Wall may form part of rear wall of the contiguous mound tombs located inboard of the wall.
- Split granite rubble wall with plug and feather marks.
- Large units of stone set in mortar with small galleting stones to fill gaps.
- Split granite coping stones.

Condition of Wall

- Wall bulging and displaced in two locations.
- Voids between stones where mortar has failed and stones are displaced.
- Water is entering through cracked and failed mortar and further undermining the integrity of the wall.

Recommended Repairs and/or Maintenance to Section 4

Please see addendum for recommendations

Priority Section 4 – Low

North End of Section 5: West Elevation. Please see 2008 map for exact location

Description of Materials and Construction

- Section forms the rear of the south mound tombs on the west elevation.
- Hybrid brick and stone construction.

Condition of Wall

- Major bowing where tree is pushing wall from outside the burying ground – possibly on private property.
- Displacement where tree had been growing from tomb side but was cut down. (Photo 42)
- Displacement caused by small tree growing from wall.
- Open and failed mortar joints

Recommended Repairs and/or Maintenance to Section North End of Section 5

Please see addendum for recommendations

Priority - Medium

South End of Section 5: West Elevation. Please see 2008 map for exact location.

Description of Materials and Construction

- Free standing brick wall construction with split granite coping stones.
- Brick wall may be tied into the rear wall of the stand alone mound tomb in front of the wall.
- Six marble tomb markers are set into wall on interior side.
- Part of wall functions as retaining wall for soil on the interior.

Condition of Wall

- Wall is bowing and leaning out.
- Wall is in danger of collapse at mid section.
- Wall plaques have become dislodged.
- Extensive mortar joint failure.

Recommended Repairs and/or Maintenance to South End of Section 5

Please see addendum for recommendations

Priority – Urgent/Critical

Sections 6 and 6a: South Elevation. Please see 2008 map for exact location.

Description of Materials and Construction

- Section consists of granite posts that at one time had wood rails that spanned between the granite posts. Wrought iron anchors for rails are still present.
- At the east end is a low granite retaining wall.
- Chain link fence adjacent to granite posts appears to be on abutter's property.

Condition of Wall

- Granite posts are in good condition but wrought iron rail attachments are rusted.
- Low retaining wall at east end is in good condition.

Recommended Repairs and/or Maintenance to Section 7

- Discuss with abutters installing a more historically appropriate fence where in place of the existing chain link fence.
- Restore appearance of burying ground fence by placing wood rails between granite posts.
- Remove small trees and bushes at east end adjacent to retaining wall.

Priority Sections 6 and 6a - Low

Section 7: East Elevation – South Section. Please see 2008 map for exact location.

Description of Materials and Construction

- Section constructed from split and dressed granite blocks with granite coping stones set in mortar with granite shim stones.
- Coping stones tooled at top surface to create wash with rock faced finish and tooled margin at sides

Condition of Wall

- Wall section is generally in good condition but mortar joints between coping stone units are open and failing.
- Coping stones are wider than wall in some locations.
- Water entering through open joints between the coping stones has deteriorated the mortar below the coping stones and dislodged the small stones that support the coping stones
- Small trees and shrubs growing adjacent to the wall have begin to push against the wall and shift the stones.

Recommended Repairs and/or Maintenance to Section 7

- Remove small trees and shrubs growing adjacent to wall.
- Repoint 100% of the upward facing joints between the coping stones to full depth using a compatible mortar.
- Clean out soil and debris from under the coping stones and repack the void with mortar and small shim granite shim stones.

Priority Section 7 - Medium

Section 8: East Elevation – North End. Please see 2008 map for exact location as well as photographs 12, 55 and 56 for conditions.

Description of Materials and Construction

- Section eight is constructed in an identical manner as section seven except that it curves to the north.

Condition of Wall

- Five coping stones are displaced – four of which are lying on the ground.
- 1 short coping stone is broken and a second is cracked.
- Some open and failed mortar joints.

Recommended Repairs and/or Maintenance to Section 8

- Repair cracked and broken coping stones with epoxy and stainless steel pins.
- Re-set displaced coping stones.
- Repoint open and failed mortar joints with mortar that matches existing.
- Clean out soil and debris from under the coping stones and repack the void with mortar and small shim granite shim stones.

Priority Section 8 - Medium

Section 9: West Elevation. Please see 2008 map for exact location as well as photographs 7 – 11, 13, 14 for conditions.

Description of Materials and Construction

- Long rectangular split granite blocks set on small stone shims.
- Wall may be part of rear of freestanding tomb.

Condition of Wall

- Two mature trees growing out of the top of the tomb are pushing on the wall and causing the upper course of stone to shift and lean towards the north.

Recommended Repairs and/or Maintenance to Section 9

- Remove trees and roots.
- Define property line with adjacent church.
- Coordinate work on wall with work on the tomb in case the perimeter wall is supporting the rear wall of the tomb.
- Reset stones that are out of plumb.

Priority Section 9 - Low

Section 10: North Elevation. Please see 2008 map for exact location.

Description of Materials and Construction

- Sections of the brick wall are missing – There are fragments of older brick walls lying on the ground.
- Tall shrubs have grown over the toppled and missing sections.

Condition of Wall

- Fragmented

Recommended Repairs and/or Maintenance to Section 10

- Remove shrubs and build historically appropriate wall from brick masonry.

Priority Section 10 - Low

Section 11: North Elevation. Please see 2008 map for exact location

Description of Materials and Construction

- This section consists of brick retaining walls of varying heights.
- The low section of wall has a modern bluestone coping.
- The medium high section has a cement wash for about 10 lin. ft.
- The high section has granite coping stones.

Condition of Wall

- The high section of wall is leaning out and is cracked.
- The low section of wall has extensive mortar failure.

Recommended Repairs and/or Maintenance to Section 12

- Remove existing wall sections as well as plantings and replace with a historically appropriate brick retaining wall. Salvage and reuse granite cap stones.

Priority Section 11 – Medium

Conditions assessment of
Five contiguous tombs located in Mount Pleasant Cemetery
Arlington, Massachusetts

In February 2018 Ivan Myjer of Building and Monument Conservation examined the five contiguous mound tombs located near the entrance to Mount Pleasant Cemetery. The purpose of the examination was to assess the condition of the masonry and develop recommendations for the preservation and maintenance of the structures.

All the tombs were examined from the exterior and one tomb- the second from the left – was examined in the interior by inserting a small camera into opening created by the gap between the iron door and the granite door jambs.

Description of Tombs

The five contiguous tombs, which form an interdependent masonry structure, were probably constructed at the same time. The three on the right side have the year 1843 carved into the face of the capstone along with the family names of the owners. The two on the left side do not have dates or names inscribed on the capstone but since they were constructed in the same manner and with the same materials as the three dated tombs on the right, it is reasonable to assume that they were constructed at the same time.

The five tombs have separate burial chambers and entrances but share partition walls and in one case a portion of the front wall. The tombs were constructed by digging a large ditch roughly four feet below grade and then constructing the individual rooms from random laid field stone. The walls were extended above ground and then capped with large granite slabs to create a roof. The facades of the tombs were closed with massive granite slabs to form a simple unadorned front with a small opening only large enough to pass a casket through. Each of the five tombs has its own separate façade except for tombs three and four in which a large granite unit spans between the two tombs.

Four of the entrances retain their original iron doors attached to iron straps mounted on pintels set in the granite door surround. The first tomb on the left is missing its door – the entrance has been sealed with masonry covered in cement stucco. The contiguous granite slab roofs of the were covered with soil - sloped at the ends to form the distinctive mound shape. Retaining walls were constructed at either end to keep the sloped soil cover from eroding. On the left side, (facing) the retaining wall is constructed from bricks and mortar with granite cap stones. On the right side there is a partial retaining wall constructed from granite field stones and cement mortar. It is not possible to determine if either retaining wall is original.

The floors of mound tombs constructed in New England in the first half of the 19th century were either paved with brick or stone or left bare. Stone shelves were sometimes built into walls to support the caskets but in other instances brick supports laid on the floor were used to elevate the

caskets. Tomb number 2 – the second from the left – contains the remnants of two or more caskets that appear to have been set on brick supports laid on the bare ground.

Conditions:

The tombs are generally in good condition. The capstones for tombs 1 and 2 have shifted outward between 1.5 and 2 inches. The cause of the movement is likely the expansive force of water freezing in the soil layer behind the capstone. Currently, no gap is visible between the end of the roof slabs and the shifted capstones probably because soil is covering the gap.

The two side walls are in very poor condition. The one on the right appears to be a makeshift repair from granite fieldstones and cement mortar. The one on the left is a well-constructed brick and mortar wall with granite coping stones. Generally, these types of sidewalls do not have adequate footings and can be easily dislodged or toppled. The left sidewall is leaning outward and the mortar bond between it and the front wall is broken. There is extensive mortar deterioration in the upper courses of brick and the course of bricks directly below the coping stones is completely debonded. The sidewalls serve more than a decorative purpose, they serve to keep the soil on the top and sides of the mound tomb from eroding. The soil layer in turn helps stabilize the tombs and it limits the amount of water that enters the gaps between the granite roof slabs. Rebuilding the sidewalls is vital to keeping the soil in place and limiting water infiltration into the tombs.

The masonry interior walls of tomb 2 looked to be in good condition despite the shifting of the capstone on the exterior. The four remaining iron doors are in poor condition. The straps that secure the sheet metal doors to the pintels are corroded and separating from the sheet metal. One strap is missing from each of the doors to tombs 4 and 5. While doors to tombs 4 and 5 appear to be locked or corroded in a fixed closed position, the doors to tombs 2 and 3 are slightly ajar – secured from opening fully by an iron bar hammered into the ground. As with the similar door closures at Arlington's OBG, the stake in the ground is not secure enough to keep a determined vandal from entering the tombs. All of the tombs contain human remains and some might also contain objects such as hair clasps or silver plated hinges that could be removed.

Treatment Recommendations:

Short Term 1 to 3 years

1. Monitor the movement of the capstones at tombs 1 and 2, as well as the deterioration at the left retaining wall.
2. Repair the iron doors – consult with an iron specialist. Install a more secure door closure system to prevent vandals from entering the tombs. Inspect the tomb interiors while the doors are being worked on.

Longer Term 4 - 6 years

1. Reset the capstones at tombs 1 and 2 and secure the capstones to the granite roofs with stainless steel anchors. As part of the same project, rebuild the left retaining wall with an adequate footing and also attach it to the front wall and if possible the granite roof with

stainless steel anchors. Replace the missing iron door from Tomb 1. Inspect the interior of the tombs when the doors are being replaced.



The five tombs are structurally interdependent, sharing common walls and a continuous front wall. The iron door at Tomb 1 is missing but the pintels remain in the granite.



Tomb 2 interior. The random laid walls as well as the granite slab ceiling are in view. The floor is covered with the remnants of wooden caskets.





The brick retaining wall is leaning outward and the upper courses are debonded.



The metal doors are badly corroded and the straps securing them to the hinges are either missing or detaching from the sheet metal. The door closure system – a bar hammered into the ground is not very secure.

Addendum to 2018 Arlington Burying Ground Tomb Assessment Report:

Probes and Investigation to Determine the Structural Relationship Between the Perimeter Walls and the Rear of the Tombs with Recommendations for Repair

Executive Summary:

In August and September of 2018 Building and Monument Conservation completed probes and assessments of the perimeter walls of the Old Burying Ground. The goals of the investigation were to determine the structural relationship between the rear walls of the three sets of mound tombs and the perimeter walls of the Old Burying Ground.

During the recently completed tomb and wall assessment sections of the perimeter walls were observed to be highly deteriorated and/or tilting outward. The proximity of the walls to the rear elevation of the tombs raised a concern that rebuilding of the walls might impact the structure of the tombs and/or expose human remains. Determining the relationship between the perimeter walls and the tombs is a key component of developing an accurate scope of work for the repair of the tombs.

Summary of Assessment Methods:

The initial proposal was to probe the perimeter walls along the west boundary of the burying ground by removing bricks, stone and mortar from the parking lot side of the sections wall in order to determine if the rear walls of the tombs were distinct constructions that were separate from the perimeter walls or, interwoven with the perimeter walls. The first set of probes proved to be inconclusive because, without knowing the configuration and exact locations of the tomb roofs, it was impossible to determine if the probes were above or below the structural support of the granite slab roof. The approach was revised to include opening three of the tombs to take measurements from the interior and then probe the wall from inside the tomb rather than from the exterior. This approach allowed us to establish the dimensions of the tombs as well as the thickness and exact location of the support walls of the tombs relative to the positioning of the perimeter walls in various locations.

Summary of Major Findings:

West Row of 10 Contiguous Mound Tombs

The short answer is that the perimeter wall along the west boundary of the Old Burying Ground is structurally part of the rear walls of the ten contiguous mound tombs along the western edge of the cemetery. This however does not mean that the interiors of all of the tombs, or the structural integrity of the tombs will be impacted by repairing and/or rebuilding the west perimeter wall. The height of the perimeter wall varies from about 30 inches above grade to 48 inches above grade. The roofs of the tombs are located about 15 inches above grade. This means that the major part of the perimeter wall is located above the roofs and walls of the tombs. The sections of the perimeter wall that are above the roof line of the tombs can be safely removed without impacting the tombs or exposing

the interior. Only the removal and repair of the sections of the wall located between the ground and the underside of the tomb roof (roughly 15 to 20 inches) would potentially impact the tombs. A further consideration is that not all of the west perimeter wall needs to be disassembled- roughly one third of the wall can be repointed without disassembling and rebuilding the wall from grade. A detailed scope for each section of the west perimeter wall is contained the next section.

The investigation also revealed that the granite slab roofs of the tombs are supported almost entirely by the masonry walls between the tombs that run perpendicular to the rear walls of the tombs. Since most of the perimeter wall is above the line of the tomb roof therefor removing it will not affect the structural integrity of the tombs. The sections of the perimeter wall that are integral to the rear wall of the tomb are the sections located below the bottom of the flat granite slab roofs of the tombs. (Ref Ska 2 below) With adequate precautions, it should be possible to remove and rebuild the tilting and deteriorated sections of the west perimeter wall without undermining the structural stability of the mound tombs or exposing the human remains located in the tombs.

James Cutter Tomb: Southwest Single Mound Tomb Adjacent to the Tilting Section of the Brick Perimeter Wall.

The section of brick perimeter wall located at the rear of the James Cutter tomb at the southwest corner of the burying ground is twelve feet from the backside of the granite cap stone. Using the 11' - 6" dimension from the backside of the cap stone to parking lot side of the perimeter wall from the adjacent row of tombs as a standard, it would appear that the brick perimeter wall is not part of the structural wall of this tomb and can be safely removed and rebuilt without impacting the tomb. A probe completed from the top of the tomb adjacent to the brick wall confirmed that the brick wall is distinct from the structure of the tomb. If, during the removal of the brick wall, a small section of the interior of the tomb is exposed, this opening should be closed up with bricks and mortar.

Removal and rebuilding of this section of the wall however should be undertaken carefully as the number of marble tomb plaques embedded in the east facing section of the wall indicates that at one time there might have been additional mound tombs in the southwestern corner of the burying ground. Another concern is that while the row of 10 contiguous tombs gain stability by sharing side walls with adjacent tombs, as well as from the interlocking granite units that make up the front wall, the stability of the stand-alone tomb in the southwest corner depends on maintaining the soil cover on top of and along the sides of the tomb.

Two sets of tombs located at the northern end of the burying ground.

The tombs along the northern edge of the burying ground differ from those on the western perimeter. The northern tombs have brick sidewalls and brick vaults for roofs rather than the granite block sidewalls and granite slab roofs found on the west.

The northern tombs are much deeper than the western tombs. At the front of the tomb there is a small antechamber but then there is a second larger room located down a flight of stairs. The wall along the northern perimeter of the burying ground directly behind the two sets of tombs consist of long blocks of granite - two courses high. While the upper course is slightly pushed out of plane, the wall is stabile and does not require removal and rebuilding. In the future, if the outward lean becomes worse, it would probably be possible to remove and reset only the upper course of granite. This activity would not have an effect on the two sets of tombs located in the northern end of the burying ground. Care however should be taken in bringing heavy equipment into the northern edge perimeter of the burying ground because the full extent of the subterranean tomb is not visible from above ground.

Documentation of Tomb Construction and Relationship with Perimeter Walls



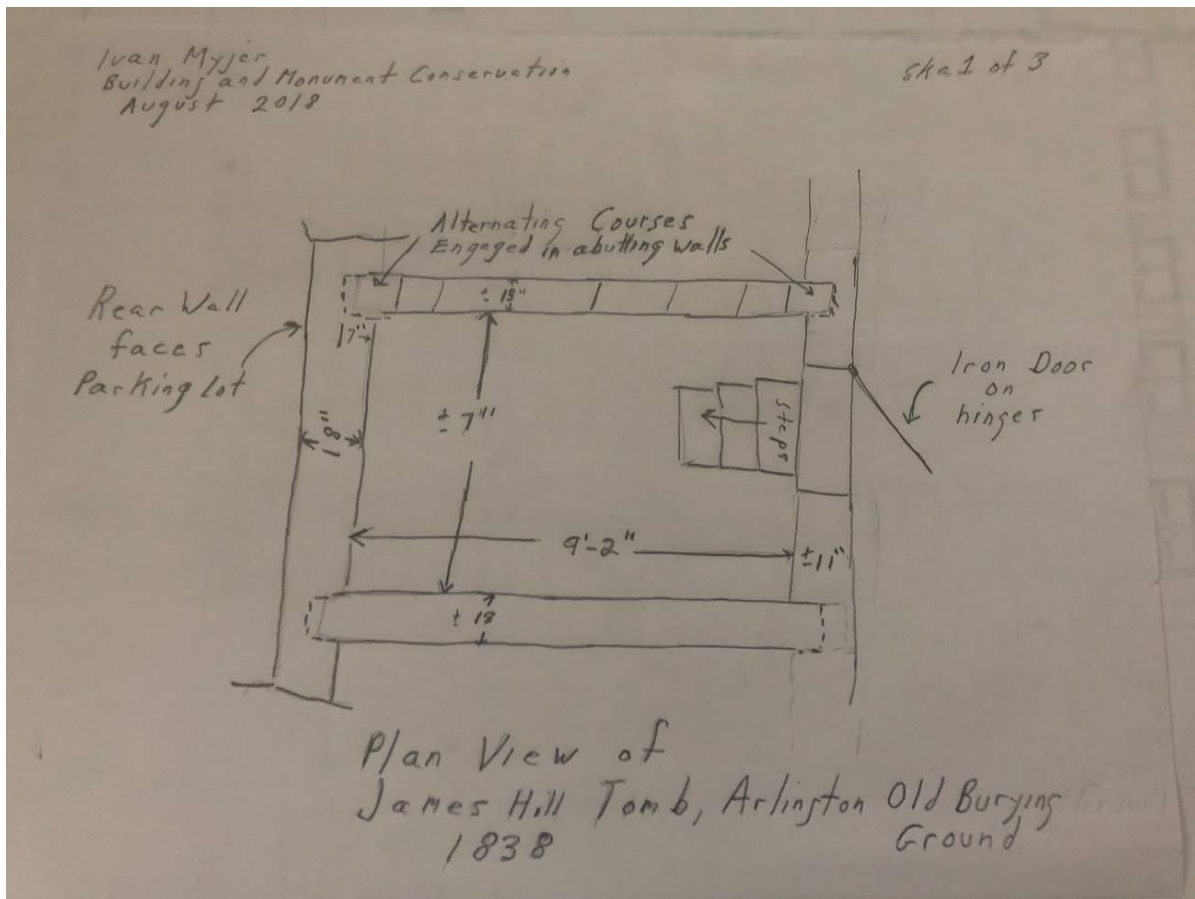
Interior view of Seth Frost Tomb with well-constructed rear wall that is in good condition. Note that granite roof slabs are supported by the side wall which is also in good condition. The last slab at the rear is wider and is supported by both the sidewalls and the rear wall. This detail is the same for all of the flat slab tombs. Ref SKA 2 below for dimensions and location of grade on the front and back of the tombs.



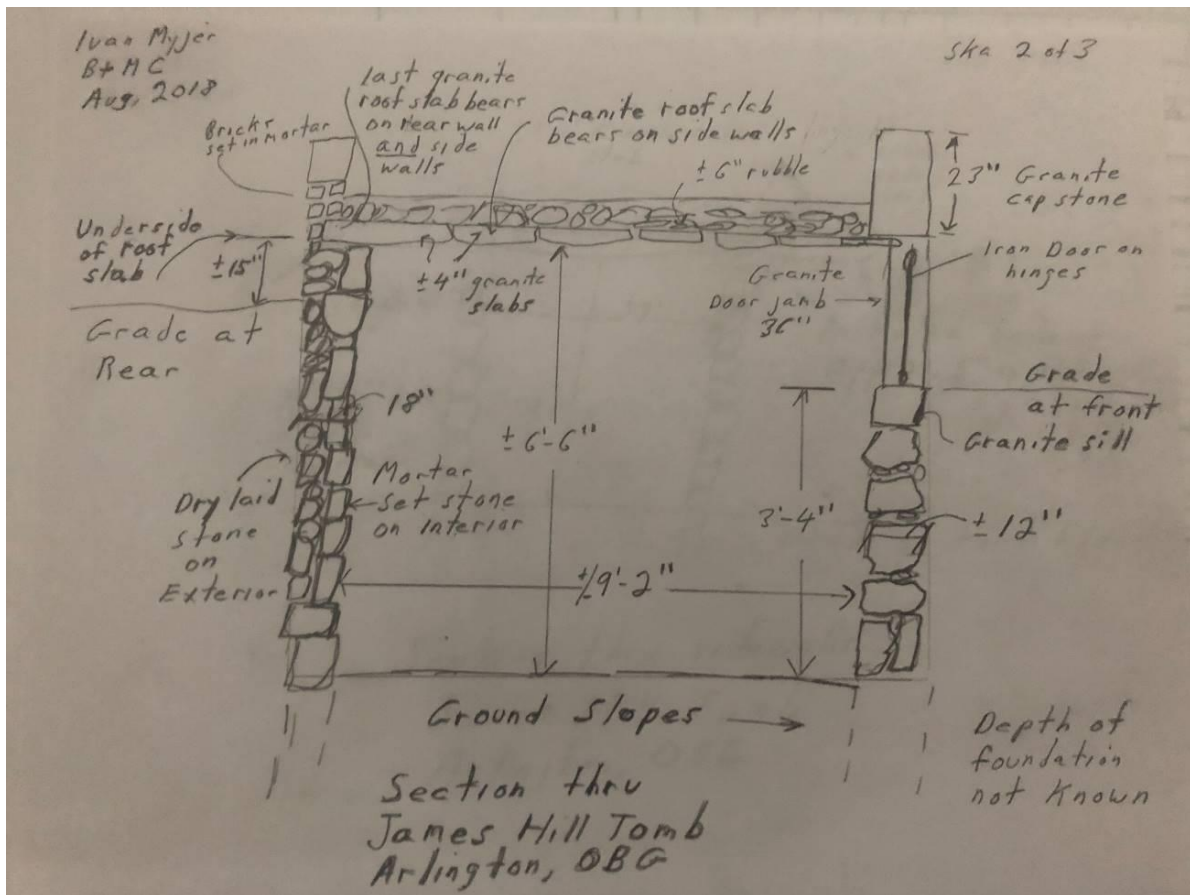
Exterior probe at the rear of the James Hill Tomb to verify the location of the underside of the slab. The underside of the granite slab closest to the perimeter wall is located about 15 inches above grade. Ref SKA 2 below. The location of the underside of the roof marks the top of the structural walls of the tomb. Ref first photograph of interior. As the perimeter wall is dissembled, the maximum portion of the structural wall that can be exposed is about 15 inches.



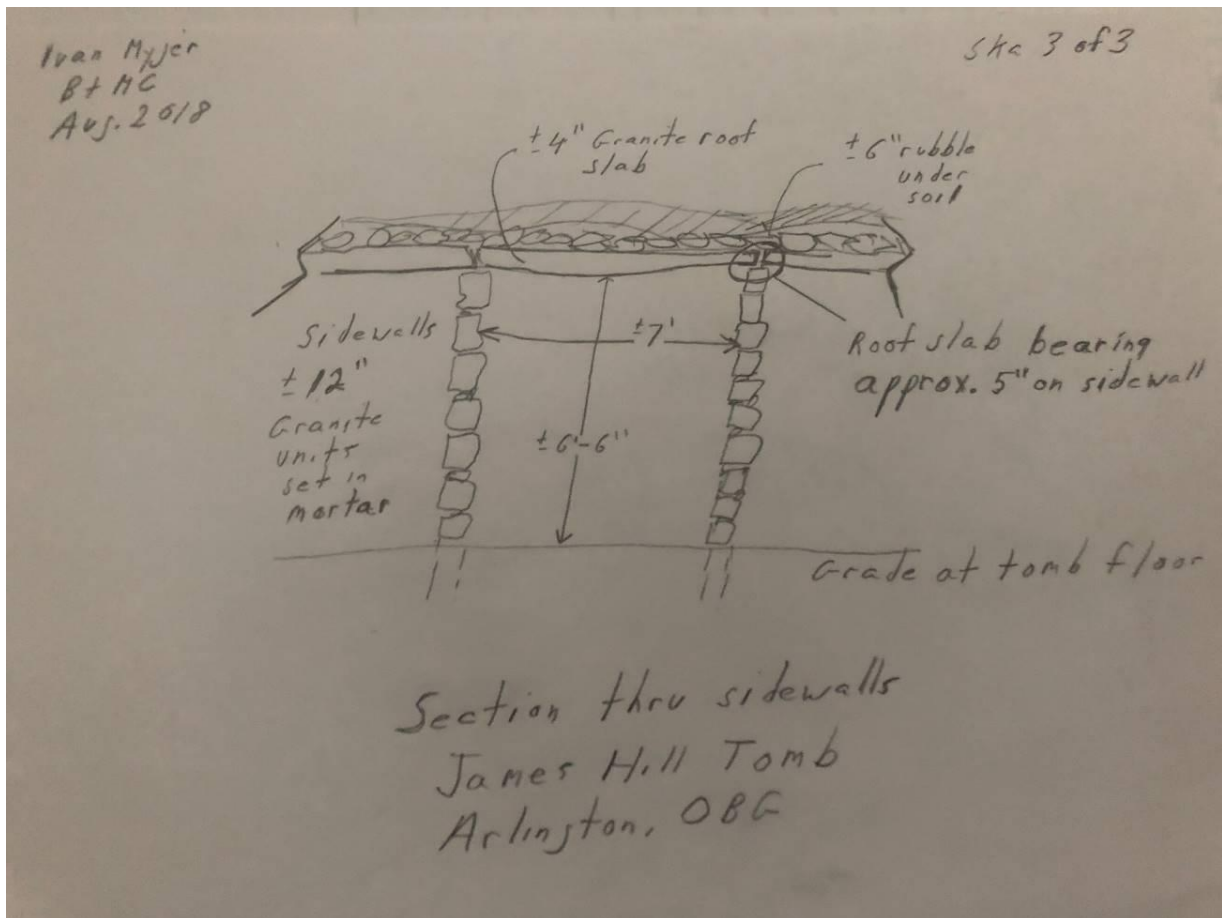
Interior of the James Hill tomb at the steps. Note the human remains and trash on the floor. The floor of the tomb is unfinished and all of the caskets have rotted away. The remains are scattered around the floor. Ref Ska 1 below for dimensions of the interior.



The sketch above shows that the structural walls of the tomb are engaged with each other to ensure stability. The photographs of the interior show that the structural walls were constructed of granite set in mortar. The photographs of the exterior show that the perimeter walls were mostly dry laid with the exception of the brickwork which is also set in mortar.



Ska 2 above shows that the perimeter wall and the structural walls of the tomb are joined. The structural walls of the tomb however were laid in mortar while the perimeter walls of the OBG were not. This distinction should make it very easy to determine where the perimeter wall ends and the structural walls begin during the disassembly of the perimeter walls. The 15-inch measurement shown above from the underside of the roof slab to the height of the soil on the rear wall defines the zone of the rear of the tombs that might be impacted by the disassembly and rebuilding of the west perimeter walls.



Ska 3 above shows that the sidewalls of the tombs are constructed from coursed granite set in mortar. The granite roof slabs bear on roughly half of the thickness of the sidewalls



Photograph of interior of brick vaulted tomb on the norther edge of the burying ground. The photograph shows the small granite roofed entry chamber in the foreground and the brick vaulted burial chamber in the background. The burial chambers of the four tombs at the northern edge of the burying ground are deeper than the single chamber on the western edge.

Recommended scope of work for each section of the west perimeter wall.

Section A: - Roughly 10 feet – extending south of entrance.

This section of wall was partially rebuilt and repointed within the last 10 years however, the coping stones for the rebuilt section are missing. The only work required in this section would be to replace the missing coping stones with new granite coping stones that match the existing. There are some large stones lying on the ground inboard of the wall but they are too narrow to serve as coping stones for this wall.

Section B- Roughly 40 feet extending from Section A to the juncture with the side wall of the first tomb. The work in Section B should be undertaken concurrently with the work in Section C on the sidewall of the first tomb.

- Powerwash wall to remove moss and other organic growths.
- Remove coping stones and retain for reuse.
- Remove loose wall stones and failed mortar directly under coping stones.
- Add matching stones to top of wall as required to create level bed for coping stones.
- Reset wall stones in mortar prior to resetting coping stones in their original locations.
- Remove loose and failing mortar on both sides of the wall and repoint joints with Type N mortar. Add small pieces of granite as required to wall to fill large voids and to shim existing wall units prior to repointing wall.
- Where possible, interweave stones from rebuilt wall in Section C into the inboard face of Section B.
- Reset coping stones in original location using a full mortar bed and then point vertical joints between units.

Section C- Sidewall of first tomb which is leaning and close to collapse. Roughly 12 feet long. The rebuilding of this section should be undertaken concurrently with the repointing of Section B. Where possible, the ends of the stones in Section C should be inserted into openings in Section B. This will reinforce both walls.

- Install barrier at top of tomb to keep soil and rubble on top of granite slab roof of tomb in place while this section of wall is rebuilt.

- Protect existing structural wall of tomb where it is exposed during the removal of the sidewall.
- Remove mortar from existing stones.
- Powerwash stones to remove moss, lichens etc
- Create new sub-grade footing for wall from crushed stone and gravel.
- Rebuild wall to match existing – reusing original stones and inserting new matching stones where needed. Use small shards of granite to shim larger stones in place,
- Set stones in mortar but deeply rake out mortar so that mortar does not come out to the faces of the stones.
- Reset existing coping stones in mortar bed in their original locations.

Section D - Roughly 35 feet from location where sidewall of first tomb meets wall to where the wall changes from large pieces of coursed granite to smaller pieces of granite rubble. Section D requires mostly just repointing but three granite coping stones at the south end of the section as well as the stones directly below them need to be removed and reset.

- Powerwash wall to remove moss and other organic growths.
- Remove and retain for re-installation the 3 displaced coping stones at the southern end of this section.
- Remove loose wall stones and failed mortar directly under coping stones.
- Add matching stones to top of wall as required to create level bid for coping stones.
- Reset wall stones in mortar prior to resetting coping stones in their original locations.
- Remove failed and cracked mortar along the entire length of this section and repoint joints using a Type S mortar with weather struck joints.

Section E – Roughly 20 feet from where the coping is displaced in Section D to the start of the section with the higher rear capstone and the introduction of brickwork into the wall. This section of the wall requires the same type of disassembly and rebuilding as Section C.

- Install barrier at top of tomb to keep soil and rubble on top of granite slab roof of tomb in place while this section of wall is rebuilt.
- Remove coping stones and retain for reinstallation.

- Take down existing wall and salvage all stones for reuse.
- Protect existing structural wall rear wall of tomb where it is exposed during the removal of the sidewall by shoring.
- In locations where there are gaps in the rear wall of the tomb, fill gaps with granite and mortar.
- Remove mortar from existing stones.
- Powerwash to remove moss, lichens etc
- Create new sub-grade footing for wall from crushed stone and gravel.
- Rebuild wall to match existing – reusing original stones and inserting new matching stones where needed. Use small shards of granite to shim larger stones in place,
- Set stones in mortar but deeply rake out mortar so that mortar does not come out to the faces of the stones.
- Reset existing coping stones in mortar bed in their original locations.

Section F – Roughly 60 feet from start of brick and stone mix to the beginning of the all brick wall. This is roughly in line with the south side of the last of the ten contiguous tombs. This entire section of wall has to be rebuilt. The difference between Section F and Section E is that Section F contains a mix of granite rubble and brickwork.

- Install barrier at top of tomb to keep soil and rubble on top of granite slab roof of tomb in place while this section of wall is rebuilt.
- Document the locations of brick coursing and obtain new, matching bricks.
- Remove coping stones and retain for reinstallation.
- Take down existing wall and salvage all stones for reuse but discard brickwork .
- Protect existing structural wall rear wall of tomb where it is exposed during the removal of the sidewall by shoring.
- In locations where there are gaps in the rear wall of the tomb, fill gaps with granite and mortar.
- Remove mortar from existing stones.
- Powerwash to remove moss, lichens etc
- Create new sub-grade footing for wall from crushed stone and gravel.

- Rebuild wall to match existing – reusing original stones and inserting new matching stones and bricks where needed. Use small shards of granite to shim larger stones in place. Create level surfaces for the placement of brick coursing.
- Brick coursing to be a minimum of two wythes thick but thicker where required.
- Set stones in mortar but deeply rake out mortar so that mortar does not come out to the faces of the stones.
- Reset existing coping stones in mortar bed in their original locations.

Section G – Roughly 50 feet from the start of the all brick construction to the end of the wall at the south side of the property. This entire section of wall has to be rebuilt on a new footing using new matching bricks. Care has to be taken to document the location and sizes of the marble tomb plaques and then construct niches in the rebuilt wall to receive the marble plaques.

- Install barrier at top of tomb to keep soil and rubble on top of granite slab roof of tomb in place while this section of wall is rebuilt.
- Document the brick bond pattern and obtain new, matching bricks as needed to rebuild the entire section.
- Remove coping stones and retain for reinstallation.
- Take down existing wall and salvage the marble plaques and coping stones for reuse - discard brickwork .
- Protect existing structural wall rear wall of tomb where it is exposed during the removal of the backwall. In locations where there are gaps in the rear wall of the tomb, fill gaps with granite and mortar.
- Provide adequate footings for the new perimeter wall.
- Rebuilding wall with matching bricks and joint sizes as well as brick bonding.
- Create niches of the existing marble tomb plaques on the interior face of the wall.
- Reset coping stones in full mortar bed and point joints between units.

June 7, 2018

Michelle de Tarnowsky
Ray Dunetz Landscape Architecture
179 Green Street
Boston, MA 02130

RE: Limited Field Investigation – Old Burying Ground - Arlington, MA
P&S Project Number: 17175

Dear Michelle,

P&S personnel investigated areas at the Old Burying Ground on February 21, 2018, in order to assess the existing site topsoil conditions with regard to supporting turf grass and tree plantings. The purpose of the study was to evaluate the thickness and quality of site soils, evaluate the drainage conditions at the site, and provide recommendations for amendment and restoration of the lawn.

P&S excavated test holes dug across the cemetery, generally evenly distributed across the area. The test pits allowed assessment of the topsoil and of the shallow subsoils at discrete sampling locations. Test pits were excavated to approximately 8-20" deep. Topsoil samples were collected to evaluate the gradation, drainage characteristics and horticultural chemistry of the media. Topsoil depth was measured at each sampling location and an assessment of soil drainage and compaction level was made at each test pit.

P&S also reviewed the draft Tree Assessment and Recommendations report by Tree Specialists Inc., dated February 16, 2018 and the Ray Dunetz Landscape Architecture (RDLA) Preliminary Assessment Report. P&S also spoke with the director of the maintenance staff who coordinates mowing and cleanup of the burying ground.

Soil samples were brought to P&S' laboratory for classification. Composite topsoil samples were submitted to the University of Massachusetts Soil Testing Laboratory for sieve with hydrometer testing and full nutrient profile. Results of laboratory tests are attached.

The topsoil samples selected for analysis were composite samples collected from five areas of the burying ground. P&S collected approximate one cup samples from 8-10 sampling points across each area. The samples were placed in a 5 gallon bucket and thoroughly mixed in the field, creating a composite sample for each area. The composite samples were bagged and brought to P&S office for characterization

and packaging for shipment to the UMass Laboratory. The Burying Ground was divided into the subsampling areas by bisecting the area on approximate north south and east west axes, and an additional sample was collected from above the tomb chambers on the west side.

Field Observations and Laboratory Results

P&S understands that this site is proposed for improvement to increase the usability, safety and beauty of the area, and recommendations regarding amendment and restoration to the horticultural soils are required. We understand that portions of the area remain wet for extended time periods after rain storms and that the appearance and performance of the turf grass is generally poor. The soil profile observed in the cemetery consists of a variable thickness of topsoil, over variable fill soils, ranging from silty sand and gravel, rocks and boulders to B-horizon subsoils. The topsoil is generally fine-grained. The existing turf exhibits reasonably good root penetration but is spotty, with numerous areas of bare ground apparent, particularly beneath existing trees. A thick layer of root mass and thatch was observed at several areas, mainly in the southwest quadrant, up to 2" thick. The maintenance director stated that to his knowledge, no amendments or any work to the existing turf has ever been done beyond mowing. The thick thatch and root mass at the surface of the soil profile is a primary cause of the poor turf conditions observed.

Observations of the area topography indicates that the cemetery drains generally from west to east, toward Pleasant Street. However, the grading of the cemetery is undulating with numerous depressions, makeshift swales and low areas that accumulate water. Our investigation was conducted in mid-February; thus, the lawn and plantings were dormant. The study was conducted after a thawing period, but some areas of frost were encountered approximately five inches below ground surface.

Compaction Level

Compaction of the lawn areas was assessed with a Dickey-John soil compaction probe. The probe device is a manually operated probe with a tee-handle and a gauge that measures the relative amount of force that is required to advance the point of the probe. It has a 1/2" or 3/4" point and a range of 0-350 psi. This device allows quick assessment of the differences in compaction at multiple locations. Compaction levels between 200-300 psi are relatively adequate for root penetration and levels below 150 psi may be subject to differential settlement. The compaction level of the topsoil was moderate across the lawn areas, in the range of 175-250 psi. The northeastern part of the lawn was generally less compact than the other areas, but that could be attributable to high soil moisture conditions.

Soil Gradation

Topsoil

The topsoil observed on site ranged from 6 to 24 inches in thickness. Many of the test locations had two layers of topsoil that were slightly different in color, though the

texture of the materials were very similar. The lower layer of topsoil was light brown in color with a significant proportion of fine to coarse gravel. The upper 3-6- inches of topsoil was darker brown and with little gravel. Samples were collected from both layers of topsoil when present.

Laboratory testing of the topsoil indicates that it has a USDA Textural classification of sandy loam to loam. The loamy topsoil ranged from 44 to 54 percent silt plus clay with an average silt plus clay content of 49 percent. The clay fraction was in the range of 11 to 12 percent, and the gravel fraction was generally in the range of 10 to 16 percent. The organic content of the sandy loam topsoil ranged from 6.7 to 8.8 percent, with an average organic content of 7.6 percent. The organic content of the soil is at an adequate level for lawn and plantings. The texture of the topsoil is more fine-grained than typically specified for public spaces and is subject to poor drainage.

Subsoil

Excavation into the subsoil was limited as it is not the focus of this study. The shallow subsoil observed consisted of stony silty fine sand. Some test holes encountered larger stones and/or boulders below the topsoil.

Soil Chemistry

Laboratory testing of the topsoil indicates that the material is relatively consistent. The pH level of the soil was very low, ranging from 4.5 to 5.0. Calcium and magnesium levels were also low, indicating that little or no limestone has been applied as part of regular maintenance. The cation exchange capacity of the soils was in the range of 15 to 16, which is good. Nutrient and micronutrient levels were generally in the low to very low range, but phosphorus levels were elevated. Fertilizer applications should be with a high nitrogen and no/low phosphorus fertilizer. Iron, lead and aluminum levels were elevated in the samples, but not at levels that are considered phytotoxic.

Discussion

General

Successful turf and optimal growth depend on a number of factors; compaction levels, drainage conditions, planting media, nutrient status and maintenance. Poor drainage, resulting in excessive wetness, can result in anaerobic conditions and rapid deterioration of newly planted turf. Soil wetness is primarily related to ground water conditions, internal soil drainage, surface grading, organic matter content and the gradation of the planting medium.

Any one of the above factors can lead to poor turf conditions. To a limited degree one factor can compensate for another. Strong surface grading can reduce the effects of poor internal soil drainage and good internal soil drainage can reduce the effects of inadequate surface gradients. However, all of the factors must be appropriately addressed in order to create successful plantings.

Internal Soil Drainage

The capacity to move water into and through the soil and to prevent saturation of the growing media is essential. The amount of water infiltration is a function of the nature of the soil surface, the gradation of the topsoil, and the surface gradient. For most areas with healthy turf, essentially all rainfall for low to moderate rates of rain will infiltrate the ground. Approximately one half of rainfall for intense rain events, such as thunderstorms, will infiltrate the ground. Depending on the dryness of the soil at the beginning of a rainfall event, one to two inches of infiltration can result in saturation of the topsoil layer, unless the water can move freely into the subsoil and away from the area.

Planting Medium Gradation

The grain size distribution of a growing medium affects internal drainage, water holding capacity, compactability, and nutrient retention. The gradation of the planting medium for high-use lawn areas must contain adequate silt and clay-sized particles and adequate organic material to provide moisture retention and nutrients for turf. However, the amount of silt and clay must be limited. Planting medium, which is too fine-grained affects conditions in four ways. First, water moves slowly through the soil to the subgrade. Second, the soil retains more water, resulting in damp conditions for longer periods of time. Third, the soil is relatively compactable, and this further reduces porosity and water movement. And fourth, the strength of the soil and turf to support vehicles and/or foot traffic is reduced. Optimum grain size distributions balance these factors for either irrigated or non-irrigated conditions.

Field observations and laboratory results indicate the soil across the site is relatively fine grained and subject to slow infiltration capacity. However, given the soil texture and relatively high organic matter content, the soil also has good moisture retention, which reduces the need for irrigation.

Findings, Conclusions and Recommendations

The purpose of the study was to evaluate the topsoil and subsurface drainage conditions at the Old Burying Ground and to develop recommendations for restoration and improvement to the turf grass. P&S understands that the cemetery is proposed for improvements, including tree work, restoration of retaining walls, improvement to headstones and tombs, and other improvements.

The findings of our investigation are that the existing topsoil is too fine grained than typically recommended for parkland, resulting in excess wetness after precipitation events. Topsoil for use in park areas must be well-drained, but also provide adequate organic matter and nutrient holding capacity to support quality turf. However, given the existing non-irrigated conditions, and that the cemetery is only subject to passive use, excess wetness caused by poorly drained soils does not appear to be a primary issue at the project site. In fact, overly dry soil conditions appear to be contributing to

failure of turf at the eastern side of the project site. The primary issues for the poor turf conditions appear to be associated with lack of maintenance. pH levels are very low, which reduces nutrient uptake and availability of nutrients. Bare ground areas have not been re-seeded and soil fertility is low. Thatch has reduced the ability for root penetration and the grades allow for ponding of water. In addition the lawn appears to be in shade for many hours of the day.

Our initial recommendation for the topsoil at the cemetery is a complete restoration of the turf areas, including installation of an irrigation system. However, we understand that the area is sensitive, and work must be conducted with minimal disturbance to historic gravesites. Therefore, a complete soil restoration is not feasible.

Preliminary Reconstruction Recommendations

Our analysis of conditions at the Old Burying Ground Field Areas indicates that major ongoing problems will continue indefinitely unless significant remedial actions are taken. The existing topsoil is too fine grained and poorly drained. Thatch and fine feeder roots from the trees have also created an impenetrable barrier to new turf rooting in many areas. Also, excessive shade from the existing trees is limiting the growth of turf. In addition, the surface grades are uneven, allowing water to pond at low spots and creating an unkempt appearance.

The soil testing indicates that most nutrient and micronutrient levels are in the low to very low range. Exacerbating nutrient availability is that the pH level of the soil ranges from 4.5 to 5.0, which is very acidic, limiting nutrient uptake.

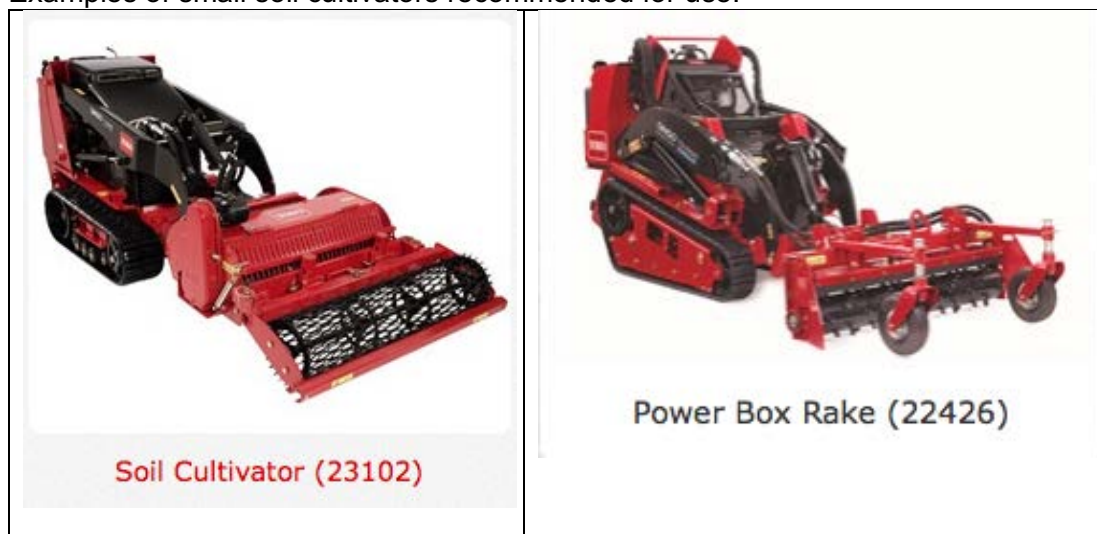
Our typical recommendations for restoration would include stripping and stockpiling topsoil, improvement to subgrade drainage conditions, and amendment and replacement of improved topsoil. This solution is not feasible in this situation due to the potential of disturbing gravesites, and the need to preserve the healthy trees at the site. Therefore, an alternate solution is presented to allow for reestablishment of turf with as little disturbance to the soils and gravesites as possible.

To reestablish the turf at the project site we recommend correcting surface grades by filling the low areas, amending the soils and re-seeding the lawn areas. In order for the new seed to properly become established, it is essential to create a proper seed bed. Small walk behind cultivators are available that will allow cultivation with minimal disturbance to existing gravesites. Headstones and other sensitive areas may need to be protected for this operation, but the machinery is relatively lightweight and compact. One such machine is a Dingo, manufactured by Toro, but there are other manufacturers of this type equipment. Photos of the recommended equipment are provided below.

A quality dependable landscape contractor should be selected for the restoration of the lawn areas. We recommend interviewing potential contractors and selecting the most qualified candidate with the most appropriate equipment available. We also

recommend creating a work plan to clearly define the scope of work and any protective measures that are necessary to preserve historical structures and protect sensitive areas. The restoration work should be observed and documented by a landscape professional to ensure the work is conducted per Plans and Specifications, and that protective measures are maintained.

Examples of small soil cultivators recommended for use.



Procedures for Establishment of New Turf

- Fill depressions with new lawn soil to allow for uniform grades that do not capture water.
- Apply pelletized limestone at 90 lbs./1,000sf. Water in thoroughly. Additional applications of limestone over time may be required
- Top dress soil up to ½" with uniformly graded sand.
- Till/cultivate soil to incorporate amendments to 2" deep, breaking up the thatch/root mass layer.
- Remove debris by raking.
- Use manual tools to blend new or re-worked soils around headstones and sensitive areas to create a smooth even surface.
- Hydroseed or slice seed entire lawn area with a shade and drought tolerant seed mix. Fescues are typically the best cultivar for this application.
- Apply temporary irrigation for the turf establishment period, typically 4-6 weeks.

All tree work and other restoration tasks should be completed prior to establishment of new turf. The new turf should be protected during the establishment period, and the new work should be monitored daily to allow for irrigation adjustments, control invasive weeds and maintain protective measures.

For planting of new trees, we understand that excavation into the existing soils must be limited. Therefore, small landscape stock should be selected, and the excavation

of soils for planting should be limited. We recommend adding approximately 25% of compost into the plant backfill soil to raise pH, provide for additional nutrients and beneficial soil microbes and also boost organic matter.

To be clear, these recommendations are based on our limited field investigation and laboratory testing. It is critical to provide construction observations and documentation during the restoration process to ensure the work is conducted according to the contract documents. Due to the very low pH level of the soil, multiple applications of pelletized limestone may be required to raise the pH level of the soil to a recommended range of 6.3-6.5. We also recommend increasing the maintenance level for the area to include frequent soil testing, fertilizer applications, limestone applications, core aeration and other maintenance tasks.

If requested, P&S will provide Specifications and construction administration services for this project under a separate Scope of Work once the final plan for lawn restoration is decided. Thank you for engaging us on this project.

Sincerely

A handwritten signature in black ink, appearing to read 'M. Agonis', with a stylized, flowing script.

Michael Agonis, Environmental Scientist
Project Manager



Soil and Plant Nutrient Testing Laboratory

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Soil Test Report

Prepared For:

Mike Agonis
Pine & Swallow Environmental
867 Boston Rd
Groton, MA 01450

m.agonis@pineandswallow.com
978-448-9511

Sample Information:

Sample ID: OBG NE

Order Number: 35176
Lab Number: S180227-131
Area Sampled: 0.2 acres
Received: 2/27/2018
Reported: 3/7/2018

Results

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H ₂ O)	4.5		Cation Exch. Capacity, meq/100g	16.8	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	15.7	
Macronutrients			Base Saturation, %		
Phosphorus (P)	16.8	4-14	Calcium Base Saturation	4	50-80
Potassium (K)	54	100-160	Magnesium Base Saturation	1	10-30
Calcium (Ca)	149	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	21	50-120	Scoop Density, g/cc	0.88	
Sulfur (S)	19.7	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	8.8	
Boron (B)	0.0	0.1-0.5	Nitrate-N (NO ₃ -N), ppm	3	
Manganese (Mn)	1.8	1.1-6.3			
Zinc (Zn)	4.2	1.0-7.6			
Copper (Cu)	1.2	0.3-0.6			
Iron (Fe)	77.4	2.7-9.4			
Aluminum (Al)	444	<75			
Lead (Pb)	45.1	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



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Recommendations for New Lawn Construction

Limestone (Target pH of 6.5)	Nitrogen, N	Phosphorus, P ₂ O ₅	Potassium, K ₂ O
325	2 - 4	0	3

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Incorporate limestone thoroughly into the top 6 inches of soil.
- Your magnesium level is low. Dolomitic limestone is recommended.
- Soil test phosphorus is above optimum. No additional P₂O₅ is required.
- Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertility.
- Avoid over-fertilization. In addition to threatening water quality, excessive nutrient applications can compromise plant health and contribute to insect and disease problems. For details, see Reference "Over-Fertilization: Its Causes, Effects and Remediation" (listed below).
- For best results, split the N, P₂O₅, and K₂O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

References:

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Step-by-Step Fertilizer Guide for Home Grounds and Gardening <http://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/step-by-step-fertilizer-guide-for-home-grounds>

Corrective Measures and Management of Over-Fertilized Soils <http://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/corrective-measures-management-of-over-fertilized>



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Recommendations for Deciduous Trees, Shrubs & Vines-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
25	.1 - .2	0	0.25

Comments:

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- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.
- Soil test values for phosphorus are above optimum. Do not add additional phosphorus at this time
- Avoid over-fertilization. In addition to threatening water quality, excessive nutrient applications can compromise plant health and contribute to insect and disease problems. For details, see Reference "Over-Fertilization: Its Causes, Effects and Remediation" (listed below).

References:

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Recommendations for Needleleaf Trees & Shrubs-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
25	.1 - .2	0	0.1

Comments:

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-For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).

-Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.

-Soil test values for phosphorus are above optimum. Do not add additional phosphorus at this time

-Avoid over-fertilization. In addition to threatening water quality, excessive nutrient applications can compromise plant health and contribute to insect and disease problems. For details, see Reference "Over-Fertilization: Its Causes, Effects and Remediation" (listed below).

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Particle Size Analysis - Comprehensive with 2mm Passing

Prepared For:

Mike Agonis
 Pine & Swallow Environmental
 867 Boston Rd
 Groton, MA 01450

m.agonis@pineandswallow.com
 978-448-9511

Sample Information:

Sample ID: OBG NE

Order Number: 35303

Lab Number: X180306-107

Received: 3/6/2018

Reported: 3/12/2018

<u>USDA Size Fraction</u>			<u>Percent of Whole Sample Passing</u>			
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>	<u>Size (mm)</u>	<u>Sieve #</u>	<u>Whole Sample % of Sample Passing</u>	<u>Finer Than 2mm % of Sample Passing</u>
Sand	0.05-2.0	50.4	2.00	#10	89.1	100.0
Silt	0.002-0.05	38.4	1.00	#18	83.6	93.8
Clay	<0.002	11.2	0.50	#35	72.5	81.3
			0.25	#60	60.4	67.7
			0.10	#140	50.7	56.8
			0.053	#270	44.2	49.6
			0.02	20 um	22.5	25.2
			0.005	5 um	11.6	13.0
			0.002	2 um	10.0	11.2
<u>Sand Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Very Coarse	1.0-2.0	6.2				
Coarse	0.5-1.0	12.5				
Medium	0.25-0.5	13.6				
Fine	0.10-0.25	10.9				
Very Fine	0.05-0.10	7.2				
<u>Silt Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Coarse	0.02-0.05	24.4				
Medium	0.005-0.02	12.2				
Fine	0.002-0.005	1.8				

USDA Textural Class: loam

Gravel Content: (%) 10.9



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Soil Test Report

Prepared For:

Mike Agonis
Pine & Swallow Environmental
867 Boston Rd
Groton, MA 01450

m.agonis@pineandswallow.com
978-448-9511

Sample Information:

Sample ID: OBG NW

Order Number: 35176
Lab Number: S180227-129
Area Sampled: 0.2 acres
Received: 2/27/2018
Reported: 3/7/2018

Results

<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>	<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>
Soil pH (1:1, H2O)	4.6		Cation Exch. Capacity, meq/100g	15.0	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	13.5	
Macronutrients			Base Saturation, %		
Phosphorus (P)	7.2	4-14	Calcium Base Saturation	8	50-80
Potassium (K)	43	100-160	Magnesium Base Saturation	1	10-30
Calcium (Ca)	248	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	16	50-120	Scoop Density, g/cc	1.04	
Sulfur (S)	14.2	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	6.8	
Boron (B)	0.0	0.1-0.5	Nitrate-N (NO3-N), ppm	2	
Manganese (Mn)	1.0	1.1-6.3			
Zinc (Zn)	1.8	1.0-7.6			
Copper (Cu)	0.9	0.3-0.6			
Iron (Fe)	62.3	2.7-9.4			
Aluminum (Al)	382	<75			
Lead (Pb)	33.2	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



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Recommendations for New Lawn Construction

Limestone (Target pH of 6.5)	Nitrogen, N	Phosphorus, P ₂ O ₅	Potassium, K ₂ O
lbs / 1000 sq ft			
275	2 - 4	0.5	3

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Incorporate limestone thoroughly into the top 6 inches of soil.
- Your magnesium level is low. Dolomitic limestone is recommended.
- Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertility.
- For best results, split the N, P₂O₅, and K₂O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

References:

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Recommendations for Deciduous Trees, Shrubs & Vines-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P ₂ O ₅	Potassium, K ₂ O
lbs / 100 sq ft			
22.5	.1 - .2	0.1	0.25

Comments:

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- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.

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Recommendations for Needleleaf Trees & Shrubs-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
22.5	.1 - .2	0.05	0.1

Comments:

-The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.

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Particle Size Analysis - Comprehensive with 2mm Passing

Prepared For:

Mike Agonis
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 978-448-9511

Sample Information:

Sample ID: OBG NW

Order Number: 35303

Lab Number: X180306-106

Received: 3/6/2018

Reported: 3/12/2018

<u>USDA Size Fraction</u>			<u>Percent of Whole Sample Passing</u>			
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>	<u>Size (mm)</u>	<u>Sieve #</u>	<u>Whole Sample % of Sample Passing</u>	<u>Finer Than 2mm % of Sample Passing</u>
Sand	0.05-2.0	51.9	2.00	#10	84.5	100.0
Silt	0.002-0.05	35.6	1.00	#18	80.0	94.7
Clay	<0.002	12.5	0.50	#35	69.6	82.4
			0.25	#60	57.9	68.5
			0.10	#140	47.8	56.5
			0.053	#270	40.7	48.1
			0.02	20 um	23.2	27.5
			0.005	5 um	12.9	15.3
			0.002	2 um	10.6	12.5
<u>Sand Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Very Coarse	1.0-2.0	5.3				
Coarse	0.5-1.0	12.3				
Medium	0.25-0.5	13.9				
Fine	0.10-0.25	12.0				
Very Fine	0.05-0.10	8.4				
<u>Silt Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Coarse	0.02-0.05	20.6				
Medium	0.005-0.02	12.2				
Fine	0.002-0.005	2.8				

USDA Textural Class: loam

Gravel Content: (%) 15.5



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Soil Test Report

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Sample Information:

Sample ID: OBG SE

Order Number: 35176
 Lab Number: S180227-132
 Area Sampled: 0.2 acres
 Received: 2/27/2018
 Reported: 3/7/2018

Results

<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>	<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>
Soil pH (1:1, H ₂ O)	4.6		Cation Exch. Capacity, meq/100g	14.8	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	13.9	
<i>Macronutrients</i>			Base Saturation, %		
Phosphorus (P)	13.6	4-14	Calcium Base Saturation	4	50-80
Potassium (K)	51	100-160	Magnesium Base Saturation	1	10-30
Calcium (Ca)	111	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	20	50-120	Scoop Density, g/cc	0.99	
Sulfur (S)	12.0	>10	Optional tests		
<i>Micronutrients *</i>			Soil Organic Matter (LOI), %	6.7	
Boron (B)	0.0	0.1-0.5	Nitrate-N (NO ₃ -N), ppm	1	
Manganese (Mn)	2.3	1.1-6.3			
Zinc (Zn)	2.1	1.0-7.6			
Copper (Cu)	1.2	0.3-0.6			
Iron (Fe)	90.9	2.7-9.4			
Aluminum (Al)	320	<75			
Lead (Pb)	41.8	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Soil and Plant Nutrient Testing Laboratory
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 website: soiltest.umass.edu

Recommendations for New Lawn Construction

Limestone (Target pH of 6.5)	Nitrogen, N	Phosphorus, P ₂ O ₅	Potassium, K ₂ O
lbs / 1000 sq ft			
275	2 - 4	0.5	3

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Incorporate limestone thoroughly into the top 6 inches of soil.
- Your magnesium level is low. Dolomitic limestone is recommended.
- Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertility.
- For best results, split the N, P₂O₅, and K₂O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

References:

Soil Lead: Testing, Interpretation & Recommendations <http://soiltest.umass.edu/fact-sheets/soil-lead-testing-interpretation-recommendations-0>

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Recommendations for Deciduous Trees, Shrubs & Vines-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P ₂ O ₅	Potassium, K ₂ O
lbs / 100 sq ft			
22.5	.1 - .2	0	0.25

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.

References:

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Recommendations for Needleleaf Trees & Shrubs-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
22.5	.1 - .2	0	0.1

Comments:

-The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.

-For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).

-Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.

References:

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General References:

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Particle Size Analysis - Comprehensive with 2mm Passing

Prepared For:

Mike Agonis
 Pine & Swallow Environmental
 867 Boston Rd
 Groton, MA 01450

m.agonis@pineandswallow.com
 978-448-9511

Sample Information:

Sample ID: OBG South

Order Number: 35303

Lab Number: X180306-108

Received: 3/6/2018

Reported: 3/12/2018

<u>USDA Size Fraction</u>			<u>Percent of Whole Sample Passing</u>			
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>	<u>Size (mm)</u>	<u>Sieve #</u>	<u>Whole Sample % of Sample Passing</u>	<u>Finer Than 2mm % of Sample Passing</u>
Sand	0.05-2.0	55.7	2.00	#10	88.2	100.0
Silt	0.002-0.05	32.6	1.00	#18	81.4	92.3
Clay	<0.002	11.7	0.50	#35	69.5	78.8
			0.25	#60	57.4	65.0
			0.10	#140	45.8	51.9
			0.053	#270	39.1	44.3
			0.02	20 um	22.7	25.7
			0.005	5 um	11.1	12.6
			0.002	2 um	10.3	11.7
<u>Sand Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Very Coarse	1.0-2.0	7.7				
Coarse	0.5-1.0	13.5				
Medium	0.25-0.5	13.8				
Fine	0.10-0.25	13.1				
Very Fine	0.05-0.10	7.6				
<u>Silt Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Coarse	0.02-0.05	18.6				
Medium	0.005-0.02	13.1				
Fine	0.002-0.005	0.9				

USDA Textural Class: sandy loam

Gravel Content: (%) 11.8



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Soil Test Report

Prepared For:

Mike Agonis
 Pine & Swallow Environmental
 867 Boston Rd
 Groton, MA 01450

m.agonis@pineandswallow.com
 978-448-9511

Sample Information:

Sample ID: OBG SW

Order Number: 35176
 Lab Number: S180227-130
 Area Sampled: 0.2 acres
 Received: 2/27/2018
 Reported: 3/7/2018

Results

<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>	<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>
Soil pH (1:1, H ₂ O)	4.6		Cation Exch. Capacity, meq/100g	16.4	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	15.5	
<i>Macronutrients</i>			Base Saturation, %		
Phosphorus (P)	14.2	4-14	Calcium Base Saturation	3	50-80
Potassium (K)	82	100-160	Magnesium Base Saturation	1	10-30
Calcium (Ca)	108	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	23	50-120	Scoop Density, g/cc	0.73	
Sulfur (S)	23.6	>10	Optional tests		
<i>Micronutrients *</i>			Soil Organic Matter (LOI), %	8.1	
Boron (B)	0.0	0.1-0.5	Nitrate-N (NO ₃ -N), ppm	1	
Manganese (Mn)	1.9	1.1-6.3			
Zinc (Zn)	2.0	1.0-7.6			
Copper (Cu)	1.3	0.3-0.6			
Iron (Fe)	62.4	2.7-9.4			
Aluminum (Al)	543	<75			
Lead (Pb)	50.3	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



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Recommendations for New Lawn Construction

Limestone (Target pH of 6.5)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
325	2 - 4	0	2

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Incorporate limestone thoroughly into the top 6 inches of soil.
- Your magnesium level is low. Dolomitic limestone is recommended.
- Soil test phosphorus is above optimum. No additional P2O5 is required.
- Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertility.
- For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

References:

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Recommendations for Deciduous Trees, Shrubs & Vines-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
25	.1 - .2	0	0.25

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.
- Soil test values for phosphorus are above optimum. Do not add additional phosphorus at this time

References:

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Recommendations for Needleleaf Trees & Shrubs-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
25	.1 - .2	0	0.1

Comments:

-The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.

-For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).

-Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.

-Soil test values for phosphorus are above optimum. Do not add additional phosphorus at this time

References:

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Soil Test Report

Prepared For:

Mike Agonis
 Pine & Swallow Environmental
 867 Boston Rd
 Groton, MA 01450

m.agonis@pineandswallow.com
 978-448-9511

Sample Information:

Sample ID: OBG TOMB

Order Number: 35176
 Lab Number: S180227-133
 Area Sampled: 0.1 acres
 Received: 2/27/2018
 Reported: 3/7/2018

Results

<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>	<i>Analysis</i>	<i>Value Found</i>	<i>Optimum Range</i>
Soil pH (1:1, H ₂ O)	5.0		Cation Exch. Capacity, meq/100g	16.0	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	13.9	
<i>Macronutrients</i>			Base Saturation, %		
Phosphorus (P)	4.3	4-14	Calcium Base Saturation	10	50-80
Potassium (K)	55	100-160	Magnesium Base Saturation	2	10-30
Calcium (Ca)	327	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	37	50-120	Scoop Density, g/cc	0.97	
Sulfur (S)	11.3	>10	Optional tests		
<i>Micronutrients *</i>			Soil Organic Matter (LOI), %	7.5	
Boron (B)	0.0	0.1-0.5	Nitrate-N (NO ₃ -N), ppm	4	
Manganese (Mn)	5.6	1.1-6.3			
Zinc (Zn)	5.4	1.0-7.6			
Copper (Cu)	0.9	0.3-0.6			
Iron (Fe)	53.3	2.7-9.4			
Aluminum (Al)	382	<75			
Lead (Pb)	54.2	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



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Recommendations for New Lawn Construction

Limestone (Target pH of 6.5)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
275	2 - 4	1	3

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
- For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-by-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).
- Incorporate limestone thoroughly into the top 6 inches of soil.
- Your magnesium level is low. Dolomitic limestone is recommended.
- Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertility.
- For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

References:

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Recommendations for Deciduous Trees, Shrubs & Vines-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
22.5	.1 - .2	0.1	0.25

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
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- Do not topdress with more than 5 lb limestone per 100 sq ft at one time. Split the above application between early spring and mid-autumn.

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Recommendations for Needleleaf Trees & Shrubs-Maintenance

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P ₂ O ₅	Potassium, K ₂ O
22.5	.1 - .2	0.05	0.1

Comments:

- The lead level in this soil is elevated. It is recommended that soils with elevated levels of extractable lead (greater than 22 ppm) be tested for Total Sorbed Lead. The UMass Soil Lab offers a Total Sorbed Metals test that measures total lead and other heavy metals. Ordering information can be found on our website here: <https://soiltest.umass.edu/ordering-information>.
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Particle Size Analysis - Comprehensive with 2mm Passing

Prepared For:

Mike Agonis
Pine & Swallow Environmental
867 Boston Rd
Groton, MA 01450

m.agonis@pineandswallow.com
978-448-9511

Sample Information:

Sample ID: OBG Tomb

Order Number: 35303

Lab Number: X180306-109

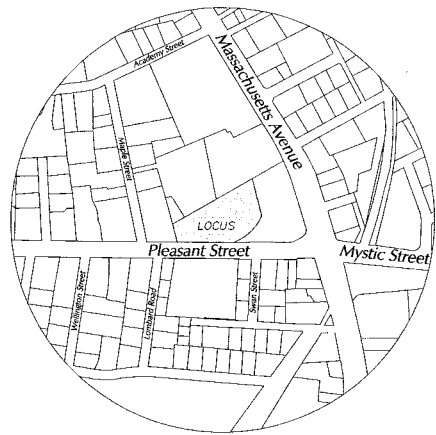
Received: 3/6/2018

Reported: 3/12/2018

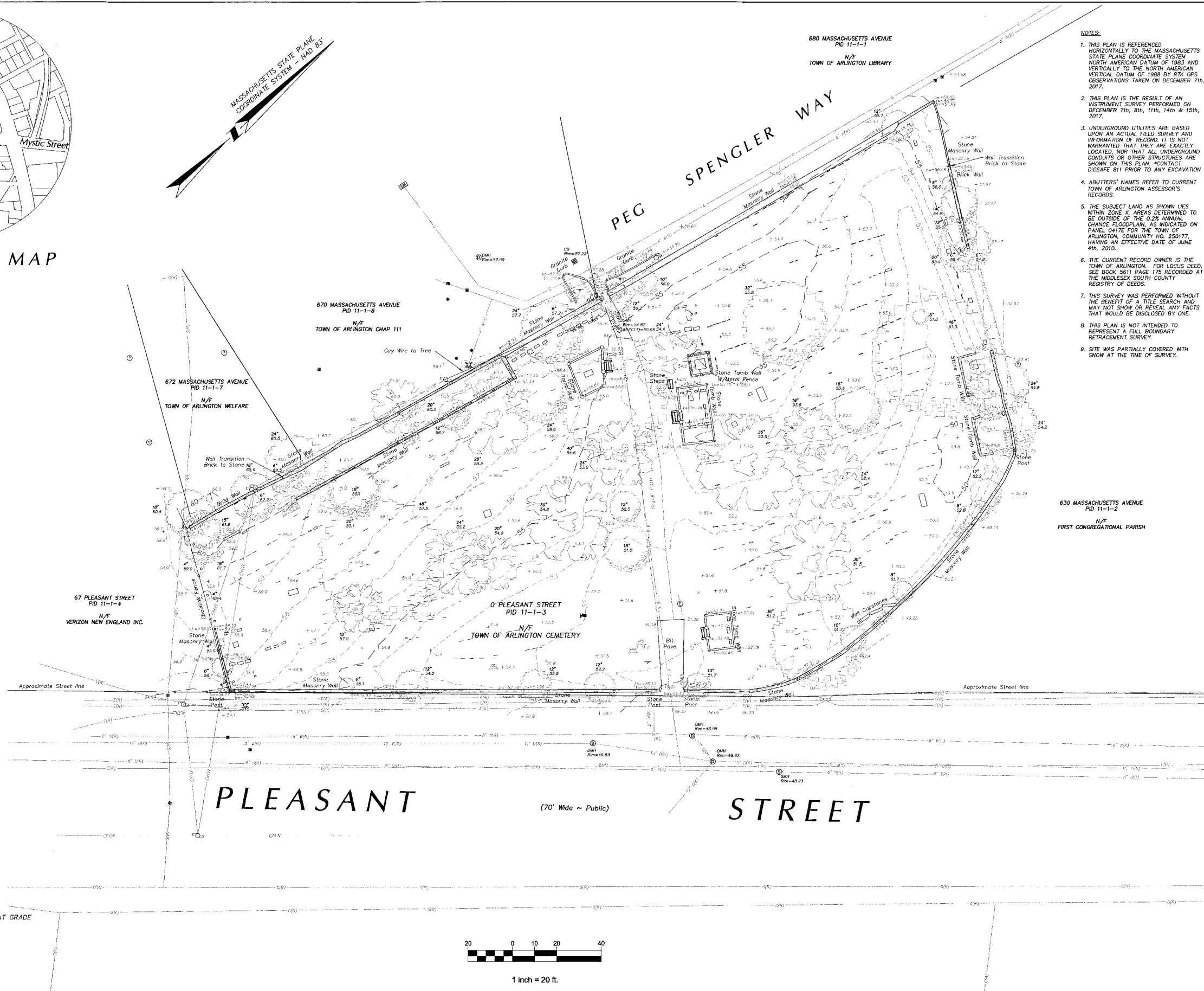
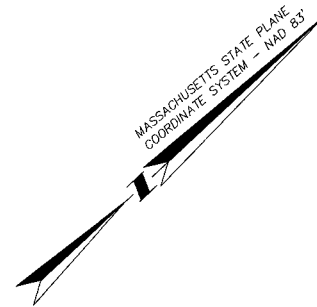
USDA Size Fraction			Percent of Whole Sample Passing			
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>	<u>Size (mm)</u>	<u>Sieve #</u>	<u>Whole Sample % of Sample Passing</u>	<u>Finer Than 2mm % of Sample Passing</u>
Sand	0.05-2.0	45.7	2.00	#10	83.6	100.0
Silt	0.002-0.05	41.6	1.00	#18	79.5	95.1
Clay	<0.002	12.7	0.50	#35	72.0	86.2
			0.25	#60	60.3	72.1
			0.10	#140	51.0	61.0
			0.053	#270	45.3	54.3
			0.02	20 um	26.4	31.6
			0.005	5 um	13.0	15.5
			0.002	2 um	10.6	12.7
<u>Sand Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Very Coarse	1.0-2.0	4.9				
Coarse	0.5-1.0	8.9				
Medium	0.25-0.5	14.1				
Fine	0.10-0.25	11.1				
Very Fine	0.05-0.10	6.7				
<u>Silt Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>				
Coarse	0.02-0.05	22.7				
Medium	0.005-0.02	16.0				
Fine	0.002-0.005	2.9				

USDA Textural Class: loam

Gravel Content: (%) 16.4



VICINITY MAP



- NOTES:
1. THIS PLAN IS REFERENCED HORIZONTALLY TO THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NORTH AMERICAN DATUM OF 1983 AND VERTICALLY TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 BY RTK GPS OBSERVATIONS TAKEN ON DECEMBER 7TH, 2017.
 2. THIS PLAN IS THE RESULT OF AN INSTRUMENT SURVEY PERFORMED ON DECEMBER 7TH, 8TH, 11TH, 14TH & 15TH, 2017.
 3. UNDERGROUND UTILITIES ARE BASED UPON AN ACTUAL FIELD SURVEY AND INFORMATION OF RECORD. IT IS NOT WARRANTED THAT THEY ARE EXACTLY LOCATED, NOR THAT ALL UNDERGROUND CONDUITS OR OTHER STRUCTURES ARE SHOWN ON THIS PLAN. *CONTACT DIGSAFE 811 PRIOR TO ANY EXCAVATION.
 4. ADJUTERS' NAMES REFER TO CURRENT TOWN OF ARLINGTON ASSESSOR'S RECORDS.
 5. THE SUBJECT LAND AS SHOWN LIES WITHIN ZONE X. AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS INDICATED ON PANEL 04176 FOR THE TOWN OF ARLINGTON, COMMUNITY NO. 250177, HAVING AN EFFECTIVE DATE OF JUNE 4TH, 2010.
 6. THE CURRENT RECORD OWNER IS THE TOWN OF ARLINGTON. FOR LOCUS DEED, SEE BOOK 5611 PAGE 175 RECORDED AT THE MIDDLESEX SOUTH COUNTY REGISTRY OF DEEDS.
 7. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE SEARCH AND MAY NOT SHOW OR REVEAL ANY FACTS THAT WOULD BE DISCLOSED BY ONE.
 8. THIS PLAN IS NOT INTENDED TO REPRESENT A FULL BOUNDARY RETRACEMENT SURVEY.
 9. SITE WAS PARTIALLY COVERED WITH SNOW AT THE TIME OF SURVEY.

samioles

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Old Burying Ground
Pleasant Road
Arlington, MA

SEAL

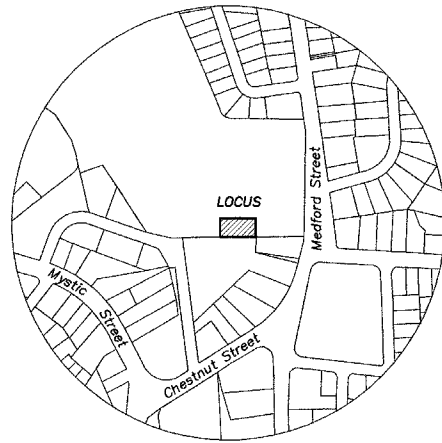


JAMES P. HORGAN - P.L.S. No. 50302
REGISTERED PROFESSIONAL
LAND SURVEYOR FOR
SAMIOLES CONSULTANTS, INC.

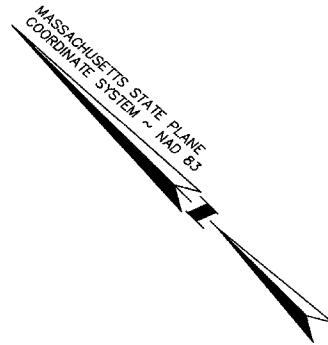
REVISION	

TOPOGRAPHIC
PLAN OF
LAND

JOB # 17181.01
DATE: 03.14.18
SCALE: 1"=20'
DRAWN BY: CY
APPROVED BY: JPH
T1.1
SHEET 1 OF 1
FILE: 17181 OLD BURYING GROUND WS.DWG

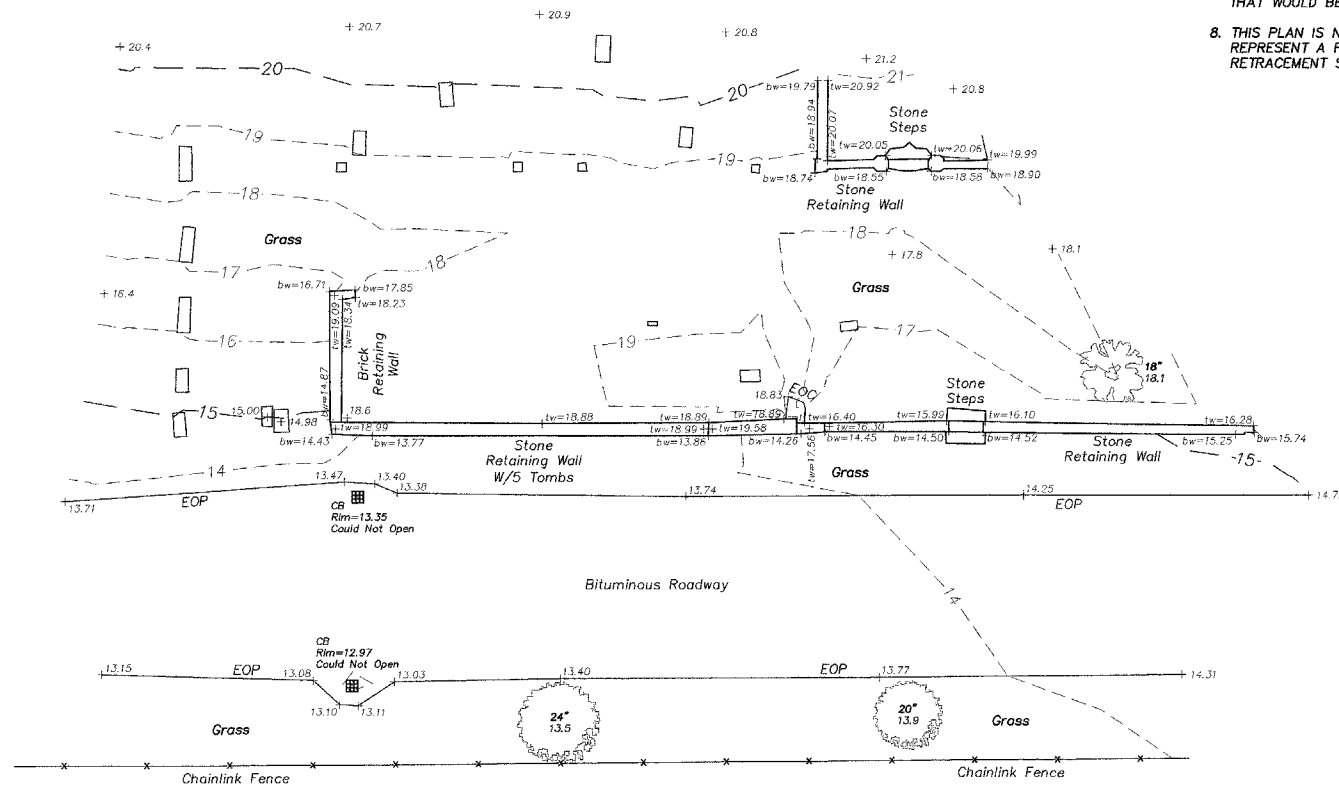


VICINITY MAP
NOT TO SCALE



NOTES:

1. THIS PLAN IS REFERENCED HORIZONTALLY TO THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NORTH AMERICAN DATUM OF 1983 AND VERTICALLY TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 BY RTK GPS OBSERVATIONS TAKEN ON DECEMBER 8, 2017.
2. THIS PLAN IS THE RESULT OF AN INSTRUMENT SURVEY PERFORMED ON DECEMBER 8, 2017.
3. UNDERGROUND UTILITIES ARE BASED UPON AN ACTUAL FIELD SURVEY AND INFORMATION OF RECORD. IT IS NOT WARRANTED THAT THEY ARE EXACTLY LOCATED, NOR THAT ALL UNDERGROUND CONDUITS OR OTHER STRUCTURES ARE SHOWN ON THIS PLAN. *CONTACT DIGSAFE 811 PRIOR TO ANY EXCAVATION.
4. THERE ARE WATER SPIGOTS LOCATED THROUGHOUT THE CEMETERY BUT THE SURVEYOR DID NOT FIND ANY INFORMATION REGARDING THE LOCATION OF THE WATER LINE.
5. THE SUBJECT LAND AS SHOWN LIES WITHIN ZONE X, AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS INDICATED ON PANEL 417E FOR THE TOWN OF ARLINGTON, COMMUNITY NO. 250177, HAVING AN EFFECTIVE DATE OF JUNE 4th, 2010.
6. THE CURRENT RECORD OWNER IS THE TOWN OF ARLINGTON. FOR LOCUS DEED, SEE BOOK 3929 PAGE 361 RECORDED AT THE MIDDLESEX SOUTH COUNTY REGISTRY OF DEEDS.
7. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE SEARCH AND MAY NOT SHOW OR REVEAL ANY FACTS THAT WOULD BE DISCLOSED BY ONE.
8. THIS PLAN IS NOT INTENDED TO REPRESENT A FULL BOUNDARY RETRACEMENT SURVEY.



LEGEND

- CATCH BASIN
- DECIDUOUS TREE
- CONIFEROUS TREE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- SPOT GRADE
- TOP OF WALL ELEVATION
- BOTTOM OF WALL ELEVATION
- INVERT NOT AVAILABLE
- EOP
- EOC



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Mt. Pleasant Cemetery
70 Medford Street
Arlington, MA



10-01-18

JAMES P. HORGAN - P.L.S. NO. 50302
REGISTERED PROFESSIONAL
LAND SURVEYOR FOR
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REVISION

LIMITED
TOPOGRAPHIC
PLAN OF LAND

JOB # 17181.01

DATE: 01-17-18

SCALE: 1"=10'

DRAWN BY: CY

REVIEWED BY: JPH

FILE: 17181.MT.PLEASANT CEMETERY WS.DWG

T-1.1

27 September 2018

Michelle de Tarnowsky
Ray Dunetz Landscape Architecture
179 Green Street
Boston, MA 02130

Reference: Old Burying Ground, Arlington, MA
Structural Conditions Assessment

Dear Michelle:

We have completed a visual survey of the five mount tombs at the Old Burying Ground in Arlington, Massachusetts. For the purposes of this report the Pleasant Street runs east-west.

General Description

Dating from 1732, the Old Burying Ground is located in Arlington's Town Center on Pleasant Street near Massachusetts Avenue.

The east edge of the Burying Ground abuts a walkway which runs along the rear of the First Parish Unitarian Universalist Church. The northeast corner and north property line front Peg Spengler Way and a parking lot shared by Robbins Library and the Whittemore-Robbins House. This area of buildings is also known as Arlington's 'Civic Block'. The western end of the burying ground abuts property owned by Verizon. The existing brick building on this parcel is over 3 stories in height, has a large footprint and casts a long shadow over the burying ground.

Noted Building Conditions and Repair Recommendations

The following conditions were noted at the Old Burying Ground, for which we have the following recommendations and estimated construction costs in parentheses:

Pleasant Street Wall

Overall the existing stone wall is in good condition with areas requiring typical maintenance repairs. The length of the wall adjacent to the Pleasant Street sidewalk has some open mortar joints. The larger openings should be filled with stone chinkers and dry-packed with mortar. The rest of open and cracked mortar joints should be cut and pointed with a compatible mortar. (\$4,500 to \$7,500)

On the east side of the entrance to the burying ground and along the curved section of the wall, there are four coping stones that have shifted or fallen off the wall and should be re-set. The broken coping stone should be pin repaired before being reinstalled. (\$2,800 to \$4,700)

There are also open mortar joints on this section of wall that should be cut and pointed with a compatible mortar. (\$2,500 to \$4,400)

Church/Northeast Wall

The boundary wall along the northeast edge of the burying ground is built of both brick and stone sections and there are four tombs which are adjacent to the wall. The tomb front walls are in good condition but the masonry side walls have shifted and should be reset. Three of the four metal tomb doors have broken or damaged hinges that should be repaired. (\$7,300 to \$12,200)

There is extensive damage and movement of the brick and stone boundary wall. The stones and bricks in the southern section of the wall have shifted. To the north of the section of the perimeter without a wall, the brick wall is leaning outward and the bricks are loose and shifted. At the northeast corner, the stone wall is bulging outward and the metal ties have broken. The stone and brick sections of northeast wall should be dismantled to sound masonry and reset to match the existing construction. (\$110,000 to \$182,800)

Robbins Library & Whittemore Robbins House / Northwest Wall

There is a stone wall approximately five feet tall between the northeast corner and the east end of the tombs. Behind the tombs the height of the wall gradually decreases to approximately three feet when measured from outside the burying ground. At the west end of the burying ground the wall material changes to brick masonry. The portion of the stone wall located at the rear side of the mound tombs has been determined to be the structural support of the tomb roof slabs.

The stone wall is in poor condition for 75% of its length with areas of loose, missing and bulging masonry. The areas that appear to be sound have a substantial moss growth in the mortar joints, which typically indicates that the inner mortar has deteriorated to sand. The brick masonry is in a similar state of deterioration as the majority of it is buckled to the point of possible collapse. The full length of the wall should be dismantled and reconstructed. If the reconstruction is to be completed in phases, it is recommended that the brick masonry portion of the wall is completed first. At the rear of the tombs, the tombs will be opened during the reconstruction of the stone masonry. All efforts should be taken to protect the remains within the tomb. If the remains are in danger of falling debris, the tomb should be entered and partially filled with sand to cover and protect the tomb contents. The marble tomb plaques set in the brick wall should be reset at their original locations and the trees growing on both sides of the wall should be removed. (\$903,800 to \$1,506,300)

There are 15 tombs that line the western half of the boundary wall. The western tomb has a separate front wall, which is slightly leaning backwards. The front stone wall row of tombs are in good condition with minimal movement of the upper stones. The mortar joints of all the tomb walls should be cut and pointed with a compatible mortar. There is a small opening into the western row tomb that should be filled with chinker stones and mortar. The eastern tomb end wall is retaining a small amount of soil and bowing outward. The end wall should be dismantled and reset. (\$150,000 to \$250,000)

Small movements in the tomb doors allowed for viewing of the interior of two tombs. Some wet mortar joints were noted along with open mortar joints in the rear stone wall. Unless additional work is to be completed at the tombs, such as the resetting or replacement of the doors, no work is needed at this time. It should be noted that it is unclear if the rear wall of the tombs are the same as the boundary wall. Great care should be taken when dismantling the boundary wall to prevent any debris from entering the tombs. If the walls are the same, the tomb and its contents should be protected during the reconstruction of the wall.

Western Boundary Wall

The western wall appeared to be in good condition and no work is required.

Report Limitations

This report is a summary of readily visible observations conducted during a single site visit to the property. This report is strictly limited to structural considerations noted.

If you have any questions regarding this report, please do not hesitate to contact this office.

Respectfully Yours,
Structures North Consulting Engineers, Inc.



Stephanie Davis, EIT



John M Wathne, PE

11 July 2018

Michelle de Tarnowsky
Ray Dunetz Landscape Architecture
179 Green Street
Boston, MA 02130

Reference: Mount Pleasant Cemetery, Arlington, MA
Structural Conditions Assessment

Dear Michelle:

We have completed a visual survey of the five mound tombs at the Mount Pleasant Cemetery in Arlington, Massachusetts. For the purposes of this report the doors to the Mount Pleasant Cemetery tombs face south.

General Description

The row of five mound tombs are constructed with stone masonry walls with stone slab ceilings. The top of the tombs have been covered with soil and a brick veneer wall installed at the west side wall and the front wall extended at the east side with newer granite stone units. The front wall for each tomb are three large granite stone units, one on each side of the door and third above. The original metal doors are located at all but one tomb opening, which has been infilled with concrete or parged masonry.

Noted Building Conditions and Repair Recommendations

The following conditions were noted at the Mount Pleasant Cemetery mound tombs, for which we have the *following recommendations and estimated construction costs in parentheses*:

- The brick masonry at the west side is cracked and the granite coping stones are shifted. *The brick masonry should be reconstructed and the coping stones reset. (\$4,500 to \$6,000)*
- The mortar joints between the tombs on the front wall are open and should be cut and pointed with a compatible mortar. (\$500 to \$1,000)
- At the two western tombs, the upper stone has shifted outward. The stone at the second tomb from the west has been resented every 2-3 years recently because of continued movement. *The stones should be removed and the tops of the tombs exposed. The roof slab mortar joints should be cut and pointed with a compatible mortar and any space between the roof slab and the*

upper front wall stones should be filled with mortar and chinker stones based upon the width of the gap before the soil is replaced. The upper stones should be re-set with pins between the lower and upper stones of the wall as well as ties back to the top of the roof slab units to prevent future movement. (\$7,000 to \$9,500)

- The metal door hinge straps are broken at the bottom of all doors and the top at the second door from the east. *The metal hinges should be repaired or replaced so that the doors are operable, close properly and locked. (\$2,800 to \$4,700)*
- At the eastern tomb, the base of the metal door is rusted to create a small opening. There is surface rust on all of the doors. *The metal doors should be removed, repaired, cleaned and painted with a rust-inhibiting paint. (\$3,400 to \$5,600)*

Report Limitations

This report is a summary of readily visible observations conducted during a single site visit to the property. This report is strictly limited to structural considerations noted.

If you have any questions regarding this report, please do not hesitate to contact this office.

Respectfully Yours,
Structures North Consulting Engineers, Inc.



Stephanie Davis, EIT



John M Wathne, PE



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Holliston, Massachusetts 01746
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www.treespecialists.com

Date June 28, 2018
Site **Arlington Old Burying Ground**
To Ray Dunetz, Ray Dunetz Landscape Architecture (RDLA)
From Barbara Keene Briggs
Subject Tree Assessment and Recommendations

Assignment

On January 22, at the request of Ray Dunetz, RDLA, Barbara Keene Briggs and David Ropes, certified arborists with Tree Specialists, Inc., conducted a site visit to the Old Burying Ground on Pleasant Street in Arlington. Our goal was to evaluate the condition of trees and provide recommendations that will facilitate the master planning and current maintenance program.

We agreed that my assignment was to conduct a *Level 2 Visual Tree Assessment*, as described in the American National Standards Institute (ANSI) publication "A300 (part 9)". This includes a 360-degree, ground-based visual inspection of the tree crown, trunk, trunk flare, above-ground roots and site conditions around the tree in relation to targets. It does not include any aerial inspection, or the use of decay detection equipment or tissue analysis.

1. Trees and standing remnants of trees will be assigned a tree identification number that will correspond to the inventory and site map provided by RDLA.
2. Evaluate the condition of the ground plane, and identify management issues as they relate to the stabilization and perpetuation of the feature.
3. The inventory will include an entry for each tree, as follows:
 - Map Identification Number
 - Identification of genus and species
 - Size – DBH and height
 - Condition assessment for health and structure
 - Recommendations rated as high, medium and low priority

Limits of Assignment

The assessment is based solely on our visual inspection conducted on January 22, 2018. No special diagnostic equipment was used and no climbing was performed. Since the assessment was conducted during the dormant season, a follow up visit during the summer months is necessary to confirm the assigned health rating for each tree. The follow up visit was performed by David Ropes on June 20, 2018.

Observations and Recommendations

Traditional New England landscapes have a unique charm, and historic burial grounds are an essential component of many "village" landscapes. The aura of antiquity is often enhanced by the presence of mature trees, and the Arlington OBG exemplifies this. As is the case with many municipal landscapes, the level of tree care has not kept up with care needed to maintain these trees, and many are in need of stabilization work. Our regional urban forests have always been met with challenges – diseases such as Dutch elm disease, and environmental conditions like drought, snow, ice, and hurricanes have ravaged our area, greatly changing the character and composition of our regional tree cover.

In the last decade we have seen a proliferation of new challenges – foliar feeding by *European Winter moth*, *Hemlock Woolley adelgid* and perhaps most significantly, drought. All of these factors are at play in the OBG landscape. For some of the trees it is too late to reverse the present state of decline. Still, the collection does contain valuable specimens, and removal of the numerous poor quality trees will only serve to enhance the presence of the remaining individuals.



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As with any comprehensive tree management program, the ideal approach would be multi-faceted:

Selective Removal

Numerous trees are in poor condition, and cannot be remediated. In some cases, large dead or structurally weakened limbs increase the risk of a failure event. These are considered *High Risk* specimens that might pose a threat to visitor safety or abutting properties. In addition, we are recommending the selective removal of “volunteer” trees that are displacing stonewalls around the perimeter. Though the inventory only includes trees, there are several shrub masses that are also growing into the walls and should be removed.

Maintenance Pruning

Modern pruning practice requires are applied to meet specific goals and objectives:

Mitigate Risk – removal of dead, dying and/or structurally weakened limbs that are in danger of falling and/or striking people, property or other *targets*.

Manage Health – removal of limbs that are dead, diseased, weak, or otherwise deleterious for the growth and development of the tree.

Manage structure – This includes the removal of “healthy” living branch structures to:

- aid in the development of good plant architecture
- decrease weight and strain on major limbs to reduce susceptibility to structural failure
- reduce or manage plant shape or size
- provide clearance for buildings or other infrastructure

Retrenchment pruning

This is an extreme form of reduction pruning that is applied under very specific conditions to retain individual trees that might otherwise need to be removed due to safety, insect/disease infestation, or infrastructure conflicts.

Plant Health Care

All trees benefit from the implementation of *plant health care* treatments to improve growing conditions, including:

- Spray or injection treatments to control insect and disease pests - as noted in the inventory.
- Soil modification and amendment to improve root health and tree longevity. Our regional soils are often poor quality, with low fertility and moisture retention. This is exacerbated on sites that practice annual leaf pick-up as this breaks the nutrient cycling process which is critical to sand-based soils. We recommend a variety of tactics to address this:
 - Soil sampling and lab testing to determine macro/micro nutrient content, soil pH, textural composition, and depth.
 - Use of composted hardwood mulches wherever possible.
 - De-compaction and sub-surface integration of organic matter when appropriate.
 - Application of bio-stimulant fertilizers and hygroscopic humectants to improve soil biotics and moisture retention.

Tree Risk Management

The cumulative effect of tree species, visible defects, and relevant site conditions are all considered when quantifying the potential for tree failure and damage to persons or property. **It is important to note that there is currently no tool or technology that allows for the prediction of tree failure.** Trees that are identified as low risk do possess a potential for failure, and trees that are designated as high risk may not fail in the short term. Still, an organized, proactive tree management program based on the results of a formal Tree Assessment is the best way to stabilize the collection and reduce the occurrence of tree failure over the long term.



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To help organize data into meaningful recommendations, three levels of priority have been defined:

High Priority

- *High-risk trees* = defect + high value target + high level of occupancy. Also listed as *High Priority* are trees that are currently displacing historic infrastructure, specifically the perimeter wall.

Medium Priority

- *Medium risk trees* = defects + high value target + medium level of occupancy.
- Stabilization work on significant specimens.
- Trees that may be a threat to the historic infrastructure in the near or medium term.

Low Priority

- Stabilization work on lower risk trees that are currently in good condition or pose minimal threat to people or the historic infrastructure.

Individual Tree Assessment (see corresponding map)

Tree ID #	Tree Species	DBH	Height	Health / Structure	Condition and/or Recommendations	Priority H/M/L
1	Flowering Cherry <i>Prunus sp.</i>	11"	18'	G/G	Co-dominant stem. Maintenance prune for crown cleaning.	L
2	Crabapple <i>Malus sp.</i>	12"	25'	F/F	Maintenance prune for crown cleaning.	M
3	Crabapple <i>Prunus sp.</i>	11"	25'	F/F	Maintenance prune for crown cleaning.	L
4	Flowering Cherry <i>Prunus sp.</i>	7"	12'	P/P	Included bark in codominant stem. Maintenance prune for crown cleaning.	M
5	Ash <i>Fraxinus sp.</i>	8"	30'	Dead	Small volunteer growing in a low retaining wall and granite post. Cut down.	M
6	Sugar Maple <i>Acer saccharum</i>	5"	20'	G/G	Growing through fence and into wires. Cut down.	M
7	Norway Maple <i>Acer platanoides</i>	4"	15'	G/G	Growing against fence and a granite post. Cut down.	M
8	Euonymus sp.	4"	5'	Dead	Invasive volunteer at base of post. Cut down	M
9	Black Walnut <i>Juglans nigra</i>	21"	50'	F/P	Asymmetrical form, girdling root. Cut girdling root and maintenance prune for end weight reduction on the long heavy limbs.	H
10	Norway Maple <i>Acer platanoides</i>	16"	40'	G/F	Invasive species. Many large pruning wounds. Not an appropriate species growing close to historic infrastructure and monument markers due to their invasive roots. Cut down.	M
11	Black Walnut <i>Juglans nigra</i>	16"	50'	F/F	Many large wounds. Low live crown ratio.	M
12	Elm <i>Ulmus sp.</i>	6"	28'	P/P	Volunteer tree growing into the wires. Cut down.	M
13	Norway Maple <i>Acer platanoides</i>	17"	40'	F/F	Growing against wall. Cut down.	M
14	Ash <i>Fraxinus sp.</i>	4"	18'	P/P	Volunteer growing into wires. Cut down.	M
15	Norway Maple <i>Acer platanoides</i>	24"	35'	P/P	Invasive species, growing into wires, numerous cavities. Cut down. High risk tree.	H
16	Norway Spruce <i>Picea abies</i>	21"	55'	P/G	Thin, chlorotic, dying back. Test soil and treat based on soil test results. Could be retained in the short term, but likely to continue decline.	M
17	Pin Oak <i>Quercus palustris</i>	12"	32'	G/G	Growing against wall and into wires. Cut down.	M
18	Norway Maple <i>Acer platanoides</i>	21"	25'	P/P	Dieback, cavities, high risk tree. Cut down.	H
19	Elm - <i>Ulmus sp.</i>	7.5"	20'	F/F	close to wall – cut down	M



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20	Norway Maple <i>Acer platanoides</i>	14"	30'	F/F	Invasive species growing close to wall, dieback. Cut down	M
21	Sugar Maple <i>Acer saccharum</i>	10"	25'	P/P	Near dead. Cut down.	M
22	Elm <i>Ulmus sp.</i>	15"	40'	P/P	Dieback in canopy, mulberry sprouts growing into wall and establishing into a conflict issue – remove tree	H
23	Crabapple <i>Malus sp.</i>	5"	12'	G/P	Close to wall. Maintenance prune.	L
24	Black Walnut <i>Juglans nigra</i>	14"	35'	G/G	Growing adjacent wall – may be retained - consult with mason regarding conflict with wall renovation	H
25	Elm <i>Ulmus sp.</i>	11"	35'	P/F	Growing against wall. Cut down.	M
26	Elm <i>Ulmus sp.</i>	16"	35'	Dead	Growing against wall. Cut down.	M
27	Crabapple <i>Malus sp.</i>	7"	10'	P/P	Multistem volunteer with fireblight, growing into wall. Cut down.	M
28	Crabapple <i>Malus sp.</i>	7"	10'	Dead	Volunteer with fireblight, growing into wall. Cut down.	M
29	Sugar Maple <i>Acer saccharum</i>	16"	60'	F/P	Growing adjacent wall – may be retained - consult with mason regarding conflict with wall renovation	H
30	Sugar Maple <i>Acer saccharum</i>	22"	60'	F/G	Growing close to wall. Maintenance prune.	M
31	Crabapple <i>Malus sp.</i>	10"	20'	F/F	Maintenance prune.	M
32	Crabapple <i>Malus sp.</i>	6"	18'	F/F	Growing into wall, but a small, slow growing species – may be retained.	M
33	Crabapple <i>Malus sp.</i>	7"	15'	F/F	Maintenance prune.	L
34	Flowering Cherry <i>Prunus sp.</i>	8.5"	15'	F/F	Maintenance prune.	L
35	Flowering Cherry <i>Prunus sp.</i>	10"	15'	P/P	Maintenance prune.	L
36	Sugar Maple <i>Acer saccharum</i>	32"	45'	P/P	Lost top –cavity -some portions are vigorous – trunk affecting grave stone. Crown reduction/structural bracing needed to retain tree.	H
37	White Pine <i>Pinus strobus</i>	29"	55'	G/G	Maintenance prune for end weight reduction.	M
38	Hemlock <i>Tsuga Canadensis</i>	24"	60'	F/F	Scale/Adelgid, broken limb. Prune out deadwood and broken limb. Treat for insects and boost cultural care.	M
39	Sugar Maple <i>Acer saccharum</i>	37"	55'	G/G	Maintenance prune.	L
40	Red Maple <i>Acer rubrum</i>	20"	40'	F/F	Multi stemmed/stump sprout. Maintenance prune.	M
41	Sugar maple <i>Acer saccharum</i>	21"	55'	F/F	Numerous cavities, girdling root. Cut girdling root and maintenance prune for end weight reduction.	M
42	White Pine <i>Pinus strobus</i>	19"	60'	G/G	Maintenance prune for end weight reduction.	M
43	Sugar Maple <i>Acer saccharum</i>	35"	55'	F/F	Numerous cavities, deadwood. Maintenance prune.	H
44	White Pine <i>Pinus strobus</i>	25"	65'	G/G	Maintenance prune, end weight reduction.	M
45	White Pine <i>Pinus strobus</i>	35"	65'	G/G	Maintenance prune, end weight reduction.	M
46	Elm <i>Ulmus sp.</i>	19"	35'	F/F	Deadwood. Maintenance prune for deadwood only.	M
47	Ash <i>Fraxinus sp.</i>	13"	45'	F/F	Maintenance prune. Assess health condition is summer.	M
48	White Pine <i>Pinus strobus</i>	27"	55'	G/G	Maintenance prune, end weight reduction.	M



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49	Pin Oak <i>Quercus paulustris</i>	37"	50'	P/P	Significant deadwood – pattern of decline suggests Shoestring Root Rot. Prune and boost cultural practices to prolong life.	H
50	Black Maple <i>Acer nigrum</i>	23"	45'	F/G	Deadwood. Maintenance prune for deadwood only.	M
51	Eastern Arborvitae <i>Thuja occidentalis</i>	25"	25'	P/F	Old character tree. Maintenance prune for crown cleaning and crown reduction.	M
52	White pine <i>Pinus strobus</i>	29"	60'	G/G	Stress crack. Maintenance prune for end weight reduction.	M
53	White pine <i>Pinus strobus</i>	20"	60'	G/F	Internal decay. Decay on surface roots. Prune for end weight reduction.	M
54	Hemlock <i>Thuja canadensis</i>	21"	55'	P/P	Decay on buttress roots, weak. Scale/Adelgid infestation. Prune out deadwood. Treat for insects and boost cultural care.	M
55	Sugar Maple <i>Acer saccharum</i>	37"	55'	G/G	Beautiful tree! Maintenance prune for deadwood only.	M
56	White Pine <i>Pinus strobus</i>	19"	25'	G/F	Asymmetrical, prune heavy side for end weight reduction.	M
57	Sugar Maple <i>Acer saccharum</i>	19"	45'	P/F	Dieback. Maintenance prune.	M

Summary

This site possesses many great features, including a “core canopy” of mature and healthy trees. The removal of high risk and poor quality trees will benefit remaining trees as well as other features of the landscape, including historic stone work, turf quality, and overall appearance. The recommended combination of tree care and selective removal represents the best approach for managing both the canopy resource and the landscape as a whole.

Please do not hesitate to call with any questions.

Sincerely,

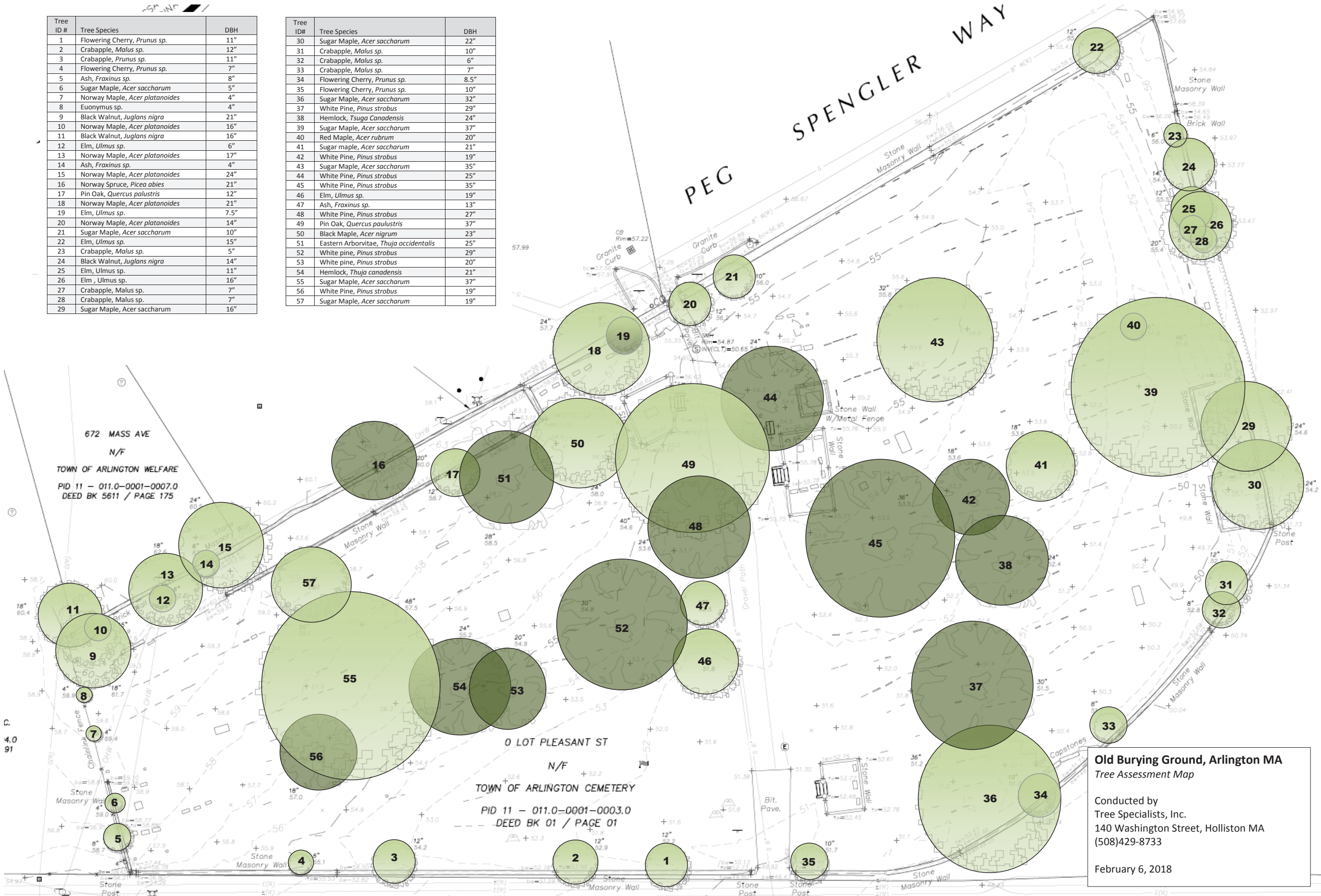
Barbara Keene Briggs
MAA Certified Arborist #1899
NE-ISA Certified Arborist #0863A

Attachment

Annotated site map showing the map #'s and tree locations that correspond to the assessment above

Tree ID #	Tree Species	DBH
1	Flowering Cherry, <i>Prunus</i> sp.	11"
2	Crabapple, <i>Malus</i> sp.	12"
3	Crabapple, <i>Prunus</i> sp.	11"
4	Flowering Cherry, <i>Prunus</i> sp.	7"
5	Ash, <i>Fraxinus</i> sp.	8"
6	Sugar Maple, <i>Acer saccharum</i>	5"
7	Norway Maple, <i>Acer platanoides</i>	4"
8	Euonymus sp.	4"
9	Black Walnut, <i>Juglans nigra</i>	21"
10	Norway Maple, <i>Acer platanoides</i>	16"
11	Black Walnut, <i>Juglans nigra</i>	16"
12	Elm, <i>Ulmus</i> sp.	6"
13	Norway Maple, <i>Acer platanoides</i>	17"
14	Ash, <i>Fraxinus</i> sp.	4"
15	Norway Maple, <i>Acer platanoides</i>	24"
16	Norway Spruce, <i>Picea abies</i>	21"
17	Pin Oak, <i>Quercus palustris</i>	12"
18	Norway Maple, <i>Acer platanoides</i>	21"
19	Elm, <i>Ulmus</i> sp.	7.5"
20	Norway Maple, <i>Acer platanoides</i>	14"
21	Sugar Maple, <i>Acer saccharum</i>	10"
22	Elm, <i>Ulmus</i> sp.	15"
23	Crabapple, <i>Malus</i> sp.	5"
24	Black Walnut, <i>Juglans nigra</i>	14"
25	Elm, <i>Ulmus</i> sp.	11"
26	Elm, <i>Ulmus</i> sp.	16"
27	Crabapple, <i>Malus</i> sp.	7"
28	Crabapple, <i>Malus</i> sp.	7"
29	Sugar Maple, <i>Acer saccharum</i>	16"

Tree ID#	Tree Species	DBH
30	Sugar Maple, <i>Acer saccharum</i>	22"
31	Crabapple, <i>Malus</i> sp.	10"
32	Crabapple, <i>Malus</i> sp.	6"
33	Crabapple, <i>Malus</i> sp.	7"
34	Flowering Cherry, <i>Prunus</i> sp.	8.5"
35	Flowering Cherry, <i>Prunus</i> sp.	10"
36	Sugar Maple, <i>Acer saccharum</i>	32"
37	White Pine, <i>Pinus strobus</i>	29"
38	Hemlock, <i>Tsuga Canadensis</i>	24"
39	Sugar Maple, <i>Acer saccharum</i>	37"
40	Red Maple, <i>Acer rubrum</i>	20"
41	Sugar maple, <i>Acer saccharum</i>	21"
42	White Pine, <i>Pinus strobus</i>	19"
43	Sugar Maple, <i>Acer saccharum</i>	35"
44	White Pine, <i>Pinus strobus</i>	25"
45	White Pine, <i>Pinus strobus</i>	35"
46	Elm, <i>Ulmus</i> sp.	19"
47	Ash, <i>Fraxinus</i> sp.	13"
48	White Pine, <i>Pinus strobus</i>	27"
49	Pin Oak, <i>Quercus paulustris</i>	37"
50	Black Maple, <i>Acer nigrum</i>	23"
51	Eastern Arborvitae, <i>Thuja occidentalis</i>	25"
52	White pine, <i>Pinus strobus</i>	29"
53	White pine, <i>Pinus strobus</i>	20"
54	Hemlock, <i>Thuja canadensis</i>	21"
55	Sugar Maple, <i>Acer saccharum</i>	37"
56	White Pine, <i>Pinus strobus</i>	19"
57	Sugar Maple, <i>Acer saccharum</i>	19"



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Maps

Digital Commonwealth

Nylander Map, Historical Society

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Ward Maps online



Memorandum

Date: 6 December 2018

To: Mr. James Feeney, Town of Arlington

From: Erik W. Farrington, P.E., and Christopher Gentile

Project: 181875 – Old Burying Ground Renovation, Arlington, MA

Subject: Construction Engineering, Phasing, and Estimating for Site Wall Renovations, Old Burying Ground, Arlington, MA

At your request, we developed a phasing scheme for the renovations and repairs to the existing site walls at the above-mentioned property with budget and priority considerations. We also developed a construction cost estimate for the initial phase of the work.

Reference documentation used to determine wall conditions, configurations, and repairs were provided by you. These documents are as follows:

- “Old Burying Ground Preservation Plan” (Draft) dated August 2018
- Structures North “Structural Conditions Assessment” dated 27 September 2018

We also visited the site several times in the recent weeks to observe the field conditions especially relating to the wall.

Our phasing scheme and cost estimate is based on a combination of correspondence with you, the noted documents, and our onsite observations of the walls.

Phasing

Our initial task involved dividing the entire perimeter into repair Phases to be managed on a budget and schedule basis. The attached site plan (Figure 1) indicates the phasing scheme we developed. We designated Phase 1 as high priority due to advanced deterioration. Phase 1 is located on Peg Spengler Way between the Old Burial Ground (OBG) entrance and the South corner just beyond the toppled brick wall. We estimated that this wall section is approximately 200 ft long.

- The “**Phase 1**” wall section is further broken down into smaller defined subsections.
- **Type A** subsection is the toppled brick wall section with tombs directly behind. This section is approximately 50 ft long.

- **Type B** subsection is constructed of stone and mortar that will require substantial disassembly and rebuilding. This wall section could be common with the end wall of the tomb and work could impact the adjacent tomb. This section is approximately 50 ft long.
- **Type C** subsection is constructed of stone and mortar that will require some disassembly and rebuilding. This wall section could be common with the end wall of the tomb and work could impact the adjacent tomb. However, impact would be minimized. This section is approximately 50 ft long.
- **Type D** subsection is constructed of stone and mortar that could require chipping and pointing joints and resetting the cap stones. This wall section has two exposed sides and will not impact buried tombs. This section is approximately 50 ft long.
- The “**Phase 2**” wall section incorporates multiple wall construction types.
 - **Type D** subsection is constructed of stone and mortar that could require cleaning, selective chipping and pointing joints, resetting stones shifted from vehicle impact, and resetting the cap stones. This wall section has two exposed sides and will not impact buried tombs. This section is approximately 160 ft long.
 - **Type E** subsection is constructed of stacked granite stones that may require resetting and levelling. Part of this wall retains soil, but does not appear to impact burials.
 - **Type F** subsection is a free standing brick masonry wall that could only require cleaning and repointing as needed.
- The “**Phase 3**” wall section is constructed of mainly dimensionally cut granite blocks with mortar bedding.
 - **Type C** subsection is constructed of stone and mortar that will require some selective disassembly and rebuilding along the curved section to reset the base blocks as needed.
 - **Type E** subsection is constructed of large granite stones and mortar that may require cleaning, resetting cap stones, and occasional repointing. This wall retains some soil, but does not appear to impact burials.
 - **Type G** subsection is constructed of large granite stones that do not appear to require significant repairs. This wall retains soil, but does not appear to impact burials. Adjacent to and behind the wall are several granite posts that may once have supported a rail or fence. We assume minimal work along this length of perimeter wall. We also assume no replacement of the original rail or fence.

Estimate

For estimating purposes, we assume sound masonry exists at grade elevation on the exterior (outside of OBG) of the wall. Based on our understanding of the work required, we developed the following construction estimates.

Phase 1	\$300,000
Phase 2	\$175,000
Phase 3	\$150,000

A breakdown of the construction cost is described in the attached construction estimate. This estimate includes and excludes the following as individually noted:

- Environmental permitting and engineering are not part of this estimate.
- Equipment and material staging area will be adjacent to work and no lease or rental costs are anticipated.
- Work is continuous, with no weather or other external delays.
- There are no tomb work or delays related to tomb investigations.
- Tree and shrubbery work including careful stump removal is performed independently and before the Phase 1 effort.
- All wall disassembly would occur down to sound masonry, and rebuilding will bear on existing base.
- Burial depth and end wall construction of the tombs are unknown and impacts of the tombs during wall reconstruction are excluded from this estimate. However, a 20% contingency is applied to the estimate to cover some level of unknown conditions.
- All materials are assumed to be in good condition and reused with the exception of the toppled brick section. A new brick facia should be utilized for this section of wall.

You also requested that we develop a budget for the engineering costs associated with developing construction documents for the wall renovations. We recommend that you budget \$60,000 for engineering efforts associated with the wall repairs. We base this budget on the following assumptions:

- Construction Documents will be developed for the entire perimeter site wall.
- Division 1 Specification will be developed by the Town.
- Construction documents will indicate the phasing scheme as described above.
- Design Team will be responsible only for the wall repairs/reconstruction.
- Deliverables will be limited to a Design Development package, 95% Construction (Bid) Documents, and 100% Construction Documents.
- Construction Administration will be limited to a pre-construction meeting with the awarded Contractor, and periodic site observations. We assumed twelve visits over the course of the entire construction project (all three phases).

Town of Arlington - Old Burial Ground Phase 1

6-Dec-18

Construction Estimate

Direct Cost Task Item	Cost	Indirect Cost	Months	Rate	Hours	Total
Staff						
Equipment Mobilization	5,918	Project Manager	2	18,911	347	37,822
Haybales and Silt Fence	3,431	Project Engineer	0	16,810	0	0
Detail Excavation - Top of Tombs for Wall Work	39,804	Project Supt	0	16,810	0	0
F&P Base and Wall for Brick Section (Type A)	11,753	Dockbuilder Supt	0	16,810	0	0
Brick Face Wall (Type A)	14,682	Safety Manager	0	14,709	0	0
Stone Wall Rebuild (Type B&C)	58,722	Survey (2)	0.00	13,395	0	0
Stone Wall Repairs (Type D)	19,521	Support Indirects				
Loam and Seed	7,759	PU Trucks/Cars	2	1,497		2,994
		Safety Supplies	1	250		250
		Subtotal				41,066
Direct Total	161,590	Indirect Total				41,066
		Direct and Indirect				202,656
		OH & P		10 & 5		30,398
		Insurance		1.25%		2,913
		Bond		0.75%		1,748
		Subtotal				237,715
		Contingency (20%)				47,543
		Subtotal				285,258
		Engineering/CA				
		SWPP Consultant				0
		Total				285,258

Town of Arlington - Old Burial Ground Phase 2

5-Dec-18

Construction Estimate

Direct Cost Task Item	Cost	Indirect Cost	Months	Rate	Hours	Total
Staff						
Equipment Mobilization	5,918	Project Manager	1	18,911	173	18,911
Haybales and Silt Fence	0	Project Engineer	0	16,810	0	0
Detail Excavation - Unload Walls for Resetting Base Stc	10,054	Project Supt	0	16,810	0	0
Dismantle Wall Sections to Base and Reset	22,468	Dockbuilder Supt	0	16,810	0	0
Stone Wall Cleaning and Repairs	51,508	Safety Manager	0	14,709	0	0
Loam and Seed	5,474	Survey (2)	0.00	13,395	0	0
Support Indirects						
		PU Trucks/Cars	2	1,497		2,994
		Safety Supplies	1	250		250
		Subtotal				22,155
Direct Total	95,422	Indirect Total				22,155
		Direct and Indirect				117,577
		OH & P		10 & 5		17,636
		Insurance		1.25%		1,690
		Bond		0.75%		1,014
		Subtotal				137,917
		Contingency (20%)				27,583
		Subtotal				165,501
		Engineering/CA				
		SWPP Consultant				0
		Total				165,501

Town of Arlington - Old Burial Ground Phase 3

5-Dec-18

Construction Estimate

Direct Cost Task Item	Cost	Indirect Cost	Months	Rate	Hours	Total
Equipment Mobilization	3,666	Staff				
Haybales and Silt Fence	0	Project Manager	1	18,911	173	18,911
Dismantle Wall Sections to Reset Base	13,339	Project Engineer	0	16,810	0	0
Stone Wall Cleaning and Repairs	55,573	Project Supt	0	16,810	0	0
Loam and Seed	5,374	Dockbuilder Supt	0	16,810	0	0
		Safety Manager	0	14,709	0	0
		Survey (2)	0.00	13,395	0	0
		Support Indirects				
		PU Trucks/Cars	2	1,497		2,994
		Safety Supplies	1	250		250
		Subtotal				22,155
Direct Total	77,951	Indirect Total				22,155
		Direct and Indirect				100,106
		OH & P		10 & 5		15,016
		Insurance		1.25%		1,439
		Bond		0.75%		863
		Subtotal				117,424
		Contingency (20%)				23,485
		Subtotal				140,909
		Engineering/CA				
		SWPP Consultant				0
		Total				140,909